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YEAR
IN BRAZIL

INGS CHARLES DENT

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414

2000



ENTRANCE TO THE BAY OF RIO DE JANEIRO (LOOKING WEST).

Frontispiece.

THE IN BRAZIL

WITH SPECIAL REFERENCE TO
THE HISTORY OF BRAZIL, THE HISTORY
OF THE EMPIRE, AND THE
REPUBLICAN GOVERNMENT.

HASTINGS, CHAMBERS, LONDON.

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A YEAR IN BRAZIL

WITH NOTES ON THE
ABOLITION OF SLAVERY, THE FINANCES
OF THE EMPIRE, RELIGION,
METEOROLOGY, NATURAL HISTORY,
ETC.

BY
HASTINGS CHARLES DENT

C.E., F.L.S., F.R.G.S.

MEMBER OF THE MANCHESTER LITERARY AND PHILOSOPHICAL SOCIETY
MEMBER OF THE VICTORIA INSTITUTE, ETC.

WITH TEN FULL-PAGE ILLUSTRATIONS AND TWO MAPS

LONDON
KEGAN PAUL, TRENCH & CO., 1, PATERNOSTER SQUARE
1886

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TO
THE LADY BEAUJOLLOIS E. C. DENT
THIS VOLUME IS DEDICATED,
AS A TRIBUTE OF
RESPECT, DEVOTION, AND GRATITUDE,
BY HER DUTIFUL SON,
THE AUTHOR.

PREFACE.

IN offering this book as a slight contribution to the bibliography of Brazil I must claim indulgence for many shortcomings. It is merely intended as a sketch ; but, in addition to the journal, which is almost entirely formed of letters written home, I have added short notes on various subjects, which I hope may be of interest to many different classes of readers.

Before starting for Brazil—which I did at a week's notice—I received letters from scientific friends intimating that they expected me to carry on extensive researches, make collections, and take notes on most of the branches of natural science. Each of the subjects would have been sufficient to occupy my whole time ; but I went out for a special purpose, to survey for a railway, in a position of considerable responsibility, and unexpected duties and anxieties devolved upon me. Respecting this work, which engrossed my attention and, of course, most of my time, I am thankful to say I was enabled to carry it out satisfactorily ; but in my book, for many reasons, I have refrained from treating on that subject in detail.

All botanists know the labour entailed by the preservation of plants, and will understand why I was unable to do what I could have wished in that line.

As regards Entomology, I took every opportunity of collecting everything that I was able to obtain ; and my workmen, knowing my predilection, continually brought me specimens.

I must here express my deep gratitude to Senhor Vicente de Azevedo Souza, of Pitanguy, Minas Geraes, who collected many insects and birds while he was with me in camp near the Serra do Cortume, in August and September, 1883 ; and subsequently sent me some fifteen hundred specimens of Coleoptera, with a few Lepidoptera and other insects, from Pitanguy.

The notes on the climatology of the mountain districts, where I resided from July, 1883, to May, 1884, at a mean altitude of three thousand feet above the sea level, will, I hope, be found of some interest.

I must refer to two very valuable works from which I have quoted largely : Professor Emanuel Liais's* "*Climats, Géologie, Faune, et Géographie botanique du Brésil*" (Paris, 1872), and Captain Richard F. Burton's† "*Explorations of the Highlands of Brazil*" (London, 1869, 2 vols.). The former is exclusively scientific, and very important as a book of reference. The latter, though published sixteen years ago, might have been produced yesterday as far as life in the interior is concerned. Both these works are most charmingly written, and I must here express the great obligation I am under to these two gentlemen, as well as to Mr. H. W. Bates, for most generously giving me special permission to make extracts from their respective volumes.

* Late Director of the Imperial Observatory at Rio de Janeiro, Astronomer of the Observatory at Paris, etc.

† Now Sir Richard F. Burton, K.C.M.G.

Captain Burton, whose knowledge of languages is perhaps unequalled, and who is well known for the daring explorations and expeditions which he has carried out, travelled from Rio de Janeiro, *viâ* Petropolis, Juiz de Fora, Barbacena, São João * del Rey, and Olhos d'Agua, to Congonhas do Campo, and thence by the Rio das Velhas to its junction with the Rio São Francisco, which river he followed some fifteen hundred miles to its *embouchure* in the province of Bahia. The earlier part of his journey often crossed the districts I visited and worked on, as will be seen by reference to the map; and for this reason I detail his route.

To attempt to rival such a book as Captain Burton's, much less M. Liais's scientific work, would be an impertinence; but if my modest journal be a means of passing a few pleasant hours, and if my notes can add anything to the store of general knowledge, I shall be content.

Although insects only were my special object, I have given the names of the species of all the various orders collected or noticed by me, as far as I have been able to determine them. They include—

							Species.
Mammals	...	...	...	...	...	...	23
Birds	...	...	...	...	...	...	35
Reptiles	...	...	...	...	...	...	11
Molluscs	...	...	...	...	...	...	25
Lepidoptera (butterflies and moths)	...	...	...	...	...	...	408
Coleoptera	...	...	...	...	...	...	402
Other insects, etc.	...	...	...	...	...	...	128
Plants	...	...	...	...	...	about	100
Total							1132

* Pronounced *Saong Joaong*.

In conclusion, I must express the sense of my great indebtedness to my mother, who has afforded me invaluable help by her suggestions on the manuscript, and by her assistance in correcting the proof-sheets; to Messrs. Ross and Mathews, my employers, for their unvarying kindness and consideration during the time I was engaged working for them; and to Mr. James Cosmo Melvill, M.A., F.L.S.; as also to the other gentlemen whose names are appended.

To Mr. Melvill, with whom I have been in constant correspondence; who has set his large entomological, conchological, and botanical collections at my disposal, and has, with the most unvarying patience, assisted me by his advice in many matters.

To Mr. W. F. Kirby, from whose books and personal kindness I have derived the greatest help.

To Mr. James Britten, F.L.S., Mr. H. N. Ridley, M.A., F.L.S., and Mr. W. Carruthers, F.R.S., of the Botanical Department, British Museum, who have devoted much time to naming my plants.

And to Mr. C. O. Waterhouse, for his benevolent assistance with the Coleoptera.

HASTINGS CHARLES DENT.

20, THURLOE SQUARE, LONDON, S.W.,
March, 1886.

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A YEAR IN BRAZIL.

CHAPTER I.

OUTWARD BOUND.

R.M.SS. "Cotopaxi," English Channel.

June 8, 1883.—Arriving at the Adelphi Hotel, Liverpool, on the evening of the 5th, I was introduced by the heads of the firm to the remainder of the staff (ten, counting myself) who form the expedition for the survey of the railway. The firm subsequently entertained us all at an excellent dinner, when "success to the expedition" was enthusiastically drunk, in addition to other toasts, and a few speeches were made.

We left Liverpool about 12.30 on the 6th inst., having been kept waiting an hour and a half on the landing stage for our tender amid a motley throng of emigrants for America, principally German and Norwegian. We passed the Great Orme's Head about three, and Holyhead at four. Quite close to the head we had a splendid view of the fine precipitous rocks going down right into the sea. About 8 a.m. on the 7th, we saw Land's End, and passed very near to it about 10 a.m., leaving it on the left and the Wolf Rock lighthouse on the right.

B

VAGABOND ABATE

A YEAR IN BRAZIL.

Our party has some of the best berths in the ship, most of them just in front of the engines, where there is hardly any motion, and scarcely any noise or smell from the machinery or pumps, etc. All our men, with one or two exceptions (including myself), have travelled much. Some think we may be home by Christmas, but it is rather early to talk about that.

I have begun to study Portuguese, and those who know it thoroughly are giving me every assistance. I like it pretty well, and hope to pick up a good deal before we reach Rio.

We have had splendid weather so far, though a bank of mist off the Land's End caused us to slow down and blow the steam-whistle—as a fog signal—every half minute. It makes a noise loud enough to waken the dead, and produces an uncomfortable feeling as of something weird and unearthly. We also sounded with the lead (having a piece of tallow at the bottom), and brought up sand and shells from a depth of fifty fathoms, though the length of line paid out was seventy fathoms—for twenty fathoms were slack rope. It is interesting to note the method of ascertaining the exact depth of the water. At the end of the line, just above the lead, is a brass tube, with an indicating needle fixed to a piston which works inside. The tube is full of air, but as the lead descends, the weight of superincumbent water causes a certain amount of it to enter the tube from the bottom; this forces up the piston, and the needle marks on a graduated scale the depth in fathoms.

By midday we were in the Atlantic. There was a good deal of rolling and some pitching, and the number of passengers on deck diminished. At midday we had made 284 miles from Liverpool (in $23\frac{1}{2}$ hours), and were 362 miles off Pauillac.

We have on board a little boy, aged six years, who, with a pug dog, was shipped at Liverpool in charge of the stewardess. He, therefore, is quite alone, and runs about the deck all day. We three—*i.e.* dog, boy, and I—have fraternized. There is also a very pleasant young Irish priest going to Bordeaux, and thence to Marseilles. He can't speak a word of French, and thinks it rather a joke. We have likewise foregathered, and have been looking into Portuguese a bit. He agrees with me, that with a knowledge of Latin and French it should be easy.

You may like to know something about food. It is excellent. Coffee and biscuits at seven ; breakfast, with cold and hot meats, porridge, eggs and bacon, beefsteak, salad, etc., at nine ; lunch, of cold meat, cheese, salad, at one ; dinner, of soup, fish, *entrées*, joints, puddings, etc., cheese, and desert, with coffee, at six ; tea, coffee, and biscuits, at 8.30 ; lights out at eleven. I look forward with great anxiety and inward craving to each meal.

We passed Ouessant, or Ushant, at 7.30 last night, and, entering the Bay of Biscay, pitched considerably. The sunset was splendid : on the horizon, three barques against a dark neutral-tint bank of clouds ; above these, apricot sky, with belts of dark purple fringed with bright orange, and floating masses of dark apricot merging into the pale blue cloudless heavens overhead ; the sea tinged with red, and the vessel rising and sinking in the dark green waves. At eight this morning we passed the *Île Dieu*, about four miles off, and 110 miles from Pauillac. Entering the mouth of the Gironde, it is very hot ; hitherto at sea it has been quite cold, and the ship rolled much, but now the yellow river is calm as glass. We are about thirty miles from Pauillac, and thence it is another forty miles to Bordeaux.

June 9, 1883.—I must now give some details of my visit to Bordeaux. Passing the Île de Ré about 12.40, we entered the line of buoys at the mouth of the Gironde at 2.30 p.m. The country on the north bank has a low coastline, *parsemé* with red-roofed white houses, and is prettily wooded after passing the sandhills which border the Bay of Biscay. On the south bank, the country is more undulating and very picturesque, with many vineyards, châteaux, and houses; it is from these former that the well-known wines Château Margaux, Lafitte, St. Julien, St. Estephe, Latour, etc., are produced, and from the châteaux they derive their names.

Arrived at Pauillac, four of us went on board the tender for Bordeaux. More of our men intended to go, but were downstairs getting a comb or a tooth-brush; and when we were clear of the ship, they were to be seen wistfully gazing after us. They were left behind. We had with us many who were getting off at Bordeaux, and half a dozen who, like us, went only for the night. Leaving Pauillac about six, we reached Bordeaux about nine p.m. The town of Pauillac, on the south bank, as seen from the river, appears insignificant; whereas it is really a very nice little place, consisting of an esplanade bordered by grass and reeds, coming down to the water, and mud-banks when the tide is out. A wooden landing stage runs out into the river. The houses are of irregular heights, one two-storied mansion being the *Grand Hôtel*. Beyond this row of houses on each side are avenues of trees and numerous haycocks.

Going by river towards Bordeaux, for some distance on each bank, the country is low but undulating, and prettily wooded, and very green, with innumerable avenues of poplars. The hay was being carried. Just opposite Pauillac there is an island about midstream, our side of the

river being about three-quarters of a mile wide. A little further up, the Gironde divides; or rather two rivers, the Dordogne from the north and the Garonne from the south, join, and are then called the Gironde.

Steaming up the Garonne to Bordeaux, we saw a great thunderstorm raging behind the high ground, on which a part of the eastern portion of Bordeaux stands; and we had then about half a dozen views, each of which would form a beautiful little picture. While the storm was raging to the east, to the west there was a splendid sunset; in the foreground the river, like oil, only disturbed by the wavelets caused by our tender, and reflecting the orange-crimson sky; then the green grassy slopes of the bank, with a background of poplars, whose black outlines stood sharply defined against the yellow horizon.

We put up at the *Hôtel de France*, and had rooms palatial in extent and height and fitting, *also in charges*. Bordeaux appears a very large and beautiful town. The east side is true country, and the ground rocky, and sometimes precipitous; while on the west side, which is flatter, there are quays the whole length, with hosts of craft of all kinds, from the large ocean-going steamers of the *Messageries Maritimes*, and other companies, to the small tugs, brigs, schooners, fishing smacks, etc. Bordeaux is a clean town, and I should much like to examine it thoroughly, as there are many interesting antiquities, such as the *Grosse Cloche*. I never saw a place so overrun by tramways; I had no idea they were so numerous, although I knew they are one of the well-known tramway companies of which, as you are aware, I have had *some* experience.

After dinner, we prowled about the town and looked in at one or two places of amusement, returning at twelve; then supper, then to bed. I was up at 5.30, and called the

others. We sallied forth, and took a tramcar going S.W. Passing the cathedral, which has a beautiful exterior, we went on as far as the Boulevard de Talence. Here we were in the midst of country roads, detached stone houses in beautiful gardens, surrounded by high stone walls, creeping vines hanging over some of them ; in fact, the *tout ensemble* very picturesque. We walked along the Boulevards de Talence and du Tondu as far as the Rue d'Orano, and then back to town by the Rue d'Alsace-Lorraine. It was now 8.30, and breakfast time. We indulged in the local *bif-ték à la bordelaise* and other delicacies, and, after a final walk round, repaired to our tender.

Being detained three-quarters of an hour before starting, I had the amusement of witnessing a civil marriage. The happy pair came to the office on the quay, attended by two or three friends ; the bride dressed in white with a veil, the bridegroom in full dress. They said a few words, the bride and bridegroom joined hands, gave a bouquet to the registrar—a little fat man in a tall hat—and the business concluded in about two minutes, when the joyous pair walked off.

June 10.—Last night at 7.30 we had a little excitement. I was on deck aft, close by the rudder, when suddenly there was a noise and a snap, and one chain of the steam-steering gear broke. We were consequently unable to steer the vessel, and, considering that we were just at the mouth of the river in rough water and running between buoys, it was rather serious. The captain and a dozen men immediately rushed aft and disconnected the steam gearing, while four men were set to work the wheel, sailors being stationed along the deck to pass the commands from the bridge. Everything, however, was put straight by 9.15. I found out in the course of the evening how the

accident happened. The steering is all done by machinery, worked by steam, from the bridge, where the officer in command is stationed, with the pilot when required. The order was given "Starboard," and the quartermaster moved the lever rather quickly, which made the piston of the steering engine work faster than usual, and, putting an extra stress on the chains which move the tiller, sheared two rivets, and so broke the connection.

We have had torrents of rain. There have been severe floods in the Garonne—along its whole length—during the last week, and damage to the amount of millions of francs has been done. Now, the evening is superb, and the bay pretty calm. Land has been out of sight all day. The clouds where they occur, which is but scantily, cast a fine purple shadow on the deep, deep blue, which reaches all round the whole circle of the horizon.

We shipped some Spaniards, Gascons, and a few French, all third-class passengers, at Bordeaux.

I have forgotten to mention that we have the incandescent electric light in the saloon and the deck cabins. This is a great luxury, and the *Cotopaxi* is the only one of the Pacific Steam Navigation Company's ships where it is in use.

June 11.—Rounded Cape Finisterre about 6 a.m., and entered the Bay of Carril at 7.30. This bay is very picturesque, and much indented with villages scattered along its shores. Carril is fifteen miles up, the bay extending some distance further; and as a background, range upon range of mountains, rugged and bare, rise from well-wooded plains and undulating hills. In the bay are a great many rocks and small rocky islands, while numerous pretty little boats, with triangular shoulder-of-mutton sails, are cruising about. We only stayed at Carril about a

couple of hours, and then went on to Vigo (fifty miles), where we arrived at three.

This bay is even finer than that of Carril, being narrower, and the mountains more precipitous. The Channel fleet was at anchor here, consisting of the *Agincourt*, *Sultan*, *Neptune*, *Minotaur*, *Northumberland*, *Achilles*, and *Humber*, the tender. The bay was alive with men-of-war boats, and the decks covered with sailors and marines. One of the lieutenants of the *Northumberland* came off to our ship.

As we had two hours at Vigo, and were anchored only a hundred yards from the quay, I went ashore with an Italian, a Chilian, a Portuguese, and some others, having arranged with a boatman, who, after a deal of haggling, said his boat was "a la disposicion de V.," for the sum of two pesetas a head (*i.e.* about 2s.) to go and return. The town is very prettily situated on the side of a hill, the older part especially picturesque—all built of stone; the streets very steep and narrow, but clean, and well paved with large blocks of stone. The newer part of the town is very different to, and less interesting than, the old portion. It has greatly extended since the opening of the railway to Madrid.

June 12.—All that I saw of the rocky shores of Galicia is bold and grand, and so also is as much of the Portuguese coast as was in sight last night.

The weather has been cold and cloudy since we left St. George's Channel till to-day; now it is very hot, with cloudless sunshine, brilliant green sea, and (8 a.m.) undulating hilly coast-line on our port (left) side.

We took on board many emigrants both at Carril and Vigo, mostly for the Plate and Chili; and it is very amusing to go forward and listen to their jargon. Some of them

are pretty, and they are mostly very dark. Being cooped up below like hens in a basket, most of them are on deck all day.

On the Atlantic.

June 13, 1883.—Now I must tell you a little about our stay at Lisbon yesterday. At nine we passed Cape Roca, and near Cintra, which latter is about fourteen miles by road from Lisbon. Entering the Tagus at 10.30, the colour of the water changed, in a well-defined line, from deep blue to yellow-green. The north bank is low, bare of trees, and slightly undulating; the rugged range of hills by Cintra rising from the plains on the horizon. The south bank is also low and sandy, uninteresting and uncultivated. There is a lighthouse built on a spit of land on the south side; and on the north bank is a fine fort, built on rocks detached from the shore and standing in the water. The Tower of Bêlem on the north bank is the boundary of the town, which extends thence some miles to the east. This tower, a very handsome old stone building at the entrance of the harbour, was built by João V., and is covered with shields and coats of arms carved in stone.

The city is beautifully situated on high, rapidly rising, and undulating ground; it contains an immense number of very fine buildings, both new and old. Cathedral, churches, monasteries, convents, and arsenal, are all seen from the river; the chief edifice, however, on which the eye rests is the Royal Palace, a large square building, standing on very high ground, and rising far above the other houses. The deep blue sky, brilliant sun, and perfectly clear atmosphere added to the beauty of the scene; the glaring white of the houses being relieved by the green venetian blinds, the olive trees, the cypresses (in the cemeteries), and the vines.

We were first boarded by the custom-house officers ; then, anchoring about noon, the P.S.N.C. agent came on board, bringing letters, etc.

At one, having bargained with a boatman to take us on shore and back for five hundred reis a-piece (about 2s.),* we embarked—a company of twelve—and were landed at the steps by the *Praça de Dom José*. This square, which is very fine, has an equestrian statue of Dom José, and the place is called by the English “Black Horse Square,” from the colour of the bronze statue. Having obtained a guide (for a milreis), we first went to the post-office in the praça, for stamps and post-cards, and next to the *Posta Restante*. We then visited the markets, and passed through several fine streets, squares, and public gardens. There are many tram routes, the cars being sometimes closed like our ordinary cars, and sometimes having rows of seats covered by an awning, resembling some of the Manchester cars, but all alike drawn by mules. The drivers think nothing of getting out of the grooves and rattling over the stones, if they meet another car on a single road, and have gone beyond the proper passing place. There is also a service of omnibuses, which run over the tram rails when the cars are out of the way. As to the shops, the principal feature which struck me was the great number there are displaying jewellery and all kinds of trinkets.

There are very many water-carriers and water-sellers, who draw water from the public fountains into the most picturesque terra-cotta jars, and then sit at the corners of the streets, or in the markets, or praças (squares), and sell it for a few reis a glass.

The gardens *are* nice. There the graceful pepper-tree,

* The Portuguese milreis is twice the value of the Brazilian milreis.

the prickly pear, cactus, aloe, and other tropical plants grow in profusion ; also a beautiful red and yellow shrub of the Borage tribe, which smells deliciously. The geraniums and pelargoniums attain the size of shrubs and trees. A lovely pink pelargonium, creeping over an arbutus to the height of some twelve or fifteen feet, was one mass of flowers. I also saw one fine india-rubber plant (*Ficus elastica*) about twenty feet high, and as much in diameter, with leaves a foot long. Rather larger than his brother in the study at home ! The heat was very great, but on we went ; and after three-quarters of an hour's ascent through picturesque and very steep streets, sometimes mounting steps with vines overhanging the walls, passing fountains surrounded by water-carriers, and people asleep in the shade under the walls, we reached the building and gardens, at the termination of the aqueduct which supplies Lisbon with water.

This being the most important engineering work in Lisbon, I was most anxious to see it. As a rule, few travellers take the trouble to visit it. The building is a plain square massive edifice, with a good vaulted and groined roof resting on four central pillars. From the flat top, which is surrounded by a wall, there is a splendid view of Lisbon, its gardens and houses, and the Tagus. Inside the house a footway surrounds the reservoir, into which the water pours from a dolphin's mouth over a mass of rock-work. The icy coldness and rushing sound of the water were most refreshing after our walk in the sweltering heat. The size of the reservoir is thirty-two metres square by nine metres deep, so the contents are 1,875,000 gallons. Ascending a steep stone staircase, we arrived at the entrance to the aqueduct, which extends about thirty-six miles into the interior, and is covered throughout. The

interior of the aqueduct is about twelve feet high by six feet wide, and has a semi-circular roof. There is a footway in the centre, and two channels—one at each side—for the water, which also flows under the pavement forming the footway. At this point the aqueduct rests on high stone arches, and is some sixty feet above the ground; but it soon passes into a hill covered with vines and Indian corn.

On our return walk we passed through a praça, called "The Square of the rolling motion." The pavement is of black and white mosaic, arranged in alternate wave-shaped curves; the square is raised slightly in the centre, and slopes to the sides; and the effect—perhaps especially to us, from having just come off the ship—was certainly remarkable. We then went to a wine cellar with vaulted roof; it was deliciously cool, and we had some splendid sweet white wine, called *Abafado moscata* (price 100 reis a glass); thence to a restaurant, where we lunched *à la Portugaise*—ham, sausages, haricots in pods, and some good red *vin du pays*, rather like a sweet claret with a considerable body. Re-embarked at 4.30, and weighed anchor at 6.45 p.m.

We have now begun our journey of over four thousand miles across the Atlantic, and the next land we expect to touch at is Rio de Janeiro. We hope to pass Teneriffe on the 15th. That huge mountain has been seen by our captain 110 miles off, by a French captain (a passenger) at fifty leagues, and by a friend of his at fifty-five leagues. We have some very pleasant fellow-passengers, including a Chilian returning to Santiago, who speaks English perfectly; the French captain (*au long cours*) bound for Rio, to take charge of a ship, whose master has lately died there; and an Italian tenor, who is going to sing at Valparaiso, and speaks French and Spanish well. My end of the table at

meals is the foreign end. Spanish and Italian, French and Portuguese, are the languages in which conversation is carried on. This is pleasant and instructive.

June 15.—The sun rose at five, just as we were off the northerly end of the island of Teneriffe, the most important of the Canaries, and the most celebrated, owing to the lofty Peak of Teneriffe, which is situate on the southerly end, and about seventeen miles from the last shore. The Peak is 3715 metres, or 12,188 feet, high, and rises very abruptly. It is also called *Pico de Teyde*. Extending along the whole east coast of the island is a range of hills, beneath which, at the north-east, lies the capital, Santa Cruz; these mountains rise near the Peak to a height of 2862 metres, or 9410 feet, and are here called *Las Canadas*. Although out at sea, the chain appears to rise abruptly from the shore; yet its great height looks insignificant from this side, owing to the whole length of the island (fifty-three miles) being seen at once; and the Canadas again dwarf the Peak, which rises seventeen miles inland, and almost behind the highest part of this range. The effect of all this is to disappoint the general observer who has anticipated something grand in an island mountain rising 12,000 feet, and I fear I must confess that most of the passengers who looked upon the Peak for the first time ridiculed his appearance very much. From the other side of the island, however, the effect is grand in the extreme. The *Cotopaxi* steamed between the islands of Teneriffe and Canaria—Grand Canary—which are about forty miles apart, ten miles or so from the former. Canaria, as it appeared at 5 a.m., presented a lofty, bold, rugged, and broken outline rising above banks of mist. Its highest point is 1952 metres, or 6404 feet. The Canary group consists of seven islands, of which Teneriffe, Canaria,

Fuerteventura, and Lanzarote are the principal; while Gomera, Palma, and Hierro or Fer are the smaller. Teneriffe is about fifty-three miles long by thirty-five broad at its widest (southerly) end; and Canaria about thirty-three miles north to south, by thirty-five east to west, or roughly circular. Canaria lies about two degrees W. from the coast of Africa. When nearly opposite the Peak, we saw the Island of Gomera to the S.W. through the mist; its highest point is 1342 metres, or 4403 feet. We passed the south end of Teneriffe at 8 a.m., and the summit of the Peak remained in sight till 1.30 p.m., when it was lost in the mist; we only saw it about sixty-five miles off, but the appearance was very fairy-like.

We are fast losing the long evenings, which is very sad; to-night (June 15th) the sun set at 6.53, and it was quite dark by 7.30. I have been much interested in examining all the French captain's charts, with his voyages marked on them. He has rounded Cape Horn twenty-four times. It was from one of his maps I obtained the particulars of the Canary Islands.

June 16.—At seven this morning we passed the only ship we have seen since leaving Lisbon, a French steamer from Bahia and St. Vincent. At 8.30 this morning we crossed the Tropic of Cancer. The French captain tells me that on ships which do not cross the line, *e.g.* going to the Antilles, *on fait la fête du tropique*; but as we shall cross the line, Neptune's visit is deferred till then. Went forward this evening to hear the Spaniards singing in chorus to their guitars. The singing was beautiful, and the scene most picturesque in the clear moonlight, but the guitars sounded very wiry. Captain Hayes says he shall note this as the calmest voyage he has made so far. We have had no rolling or pitching since we got on the

Atlantic beyond the Mediterranean, and the sky has been quite cloudless.

To-day at 12.5 we had "Fire drill." The fire-bell rang, and within three minutes three hoses were pouring water on the supposed fire; then the officers called up their respective men to the several boats (eight in all), which were lowered, etc. Everything was done quickly and well. I wonder whether all would progress as calmly in the case of a real fire.

June 17.—To-day we shall get south of the sun! This morning saw the Portuguese man-of-war (*Physalia pelagica*), and shoals of flying fish (*Exocæta volitans*). The captain's canary nearly bursts its little throat with warbling all day. This is the coolest day we have had yet; the doctor says it is the coolest voyage he has made; nevertheless, the thermometer stands at 78° in my cabin, and it is 127° in the sunshine. The captain read service this morning in the saloon.

June 18.—We passed the Cape Verd Islands quite close. The flying fish are an exceedingly pretty sight. This morning there was a shark about; we saw his triangular fin. He came into a shoal of flying fish, which rose in a body and glistened like silver in the sun. Their flight is very swift and graceful; they do not rise high above the water, but rather flit just above the surface, and not always in a straight line, as I have sometimes read.

June 19.—Began to get into the south-east trade winds, and the ship pitched and rolled a good deal.

June 20.—Had a talk with Mr. Bertrand about the Falkland Islands; he has an extensive sheep farm there. The islands are about the same latitude south as London is north of the line, but the climate is much more severe than that of England; in fact, the southern latitudes in

general are much colder than the corresponding northern latitudes. There are two principal islands—one ninety miles by fifty, the other ninety by forty-five—and several smaller islands. It is a fully fledged English colony, and the only inhabitants are natives of the British Isles, except a few foreign servants and herdsmen from South America. Sheep-raising is really the only occupation. The sheep are killed for their skins, and melted down for tallow, the meat being wasted ; so there is an opportunity either for a tinned-meat factory, or for arranging to freeze the fresh meat and then convey it to England. The best shepherds are mostly Scotchmen, who get on very well and make money. They have their passage out paid, and begin with £3 10s. per month, with meat, house-room, and firing ; they are raised to £4 the third year, and £5 the fifth year. If they stay five years, the return passage is paid. The climate is too cold for growing wheat, and the wind beats everything down. But the islands possess some of the finest harbours in the world—and there are many of them—while some are harbours within harbour, so that nearly all transport is done by water. The islands were originally taken by the Spaniards, then by the French, and lastly by the English. There are no soldiers, only police, but a gunboat of the South American squadron is generally cruising about.

I should think it must be a very desolate place to live in. Mr. Bertrand says that when he arrives (about July 15th) it will be the middle of winter, with snow and ice everywhere. It is at least thirty days from England—a bad voyage is six weeks. It has no trees, no wheat or corn ; there are only some two thousand inhabitants scattered about over different farms or holdings. The *one* town is named Sandy, and the only wild animals are the remnants of some Spanish bulls, which have now grown wild, and

are hunted on horseback whenever they are found. There is, however, some good bird-shooting.

June 21.—Passed St. Paul's Rocks about 3.15 p.m., but we failed to discover them, though the captain hunted for them. As they are only about sixty feet high, they are always difficult to find.* This evening the sun set at 6.5 ; it was quite dark by 6.20, and at 7.30 we crossed the equator. It is very cool. This is the thirty-seventh time that the French captain has crossed the line, and he will have to recross it thrice before he can again return to his wife at Bordeaux, having, when he leaves Rio, to double Cape Horn and run up the West Coast to some place near Panama.

I think the practice which obtains of killing the oxen forwards on the spar deck, in the midst of the emigrants, is disgraceful, though I must admit that most of the pretty young girls and the children look on unconcernedly ; but at least a sail might be hung, so as to prevent the other oxen witnessing their comrade's death, for I have seen them turn their heads to their expiring brother and tremble all over with terror. The sheep and pigs are slain in the butcher's shop just over my cabin. The other day I was awakened by the dying shrieks of a pig, and immediately afterwards some of his vital fluid trickled through a loose bolt-hole on to my ceiling !

* In the official report of the *Challenger* Expedition, there are three splendid photographs of St. Paul's Rocks, with an exhaustive description of the rocks, their composition, characteristics, inhabitants, etc. It is stated, "During the time the ship remained at these islets, their dangerous character was more than ever apparent ; for although their white guano-covered peaks, when lit up by the moon, were plainly visible from the ship a hundred yards distant, they were not sufficiently distinct to be recognized as land at a distance of over a mile, and without the moon would probably not be seen more than a quarter of a mile ; in short, the sound of the breakers might be the first notice given to a passing ship of their proximity."—Narrative, vol. i. pt. i. p. 202.

June 23.—Yesterday the current set the ship thirty-three miles out of her course, and therefore nearer the coast of South America than we should have been ; so at 4.30 p.m. we saw the first piece of Brazilian territory, the Island of Fernando de Noronha, which is the Brazilian convict settlement. It has one very prominent pyramidal peak which appears to stand alone, though the whole island is lofty. I could not gain much information about the place, for little is known, as the Brazilian Government keep it all very secret. But this much I picked up : the governor is changed every six months, and convicts, on obtaining a good-conduct medal, are allowed to get out their wives and families ; they have land granted to them, are obliged to report themselves occasionally, and have to pay a certain percentage of their crops, etc.

June 26.—Last night at 11.30 we came in sight of the lighthouse at Abrolhos (*i.e.* eye-opener),* the first point of the South American continent. We were in shallow water. At 7 p.m. the water was 150 fathoms deep ; sounding at 9 p.m. it was twenty fathoms ; at 11.30 only thirteen fathoms ; then 11.45, seventeen fathoms. We passed the lighthouse—twenty miles off—at midnight, and I then retired. This morning at 11.30 I saw the first piece of land (as last night it was only a light), viz. the mountains round Espirito Santo, within three hundred miles of Rio, which we hope to reach to-morrow.

* Perhaps so called as it is near dangerous rocks.

CHAPTER II.

ARRIVAL AT RIO, AND JOURNEY TO QUELUZ.

Rio de Janeiro.

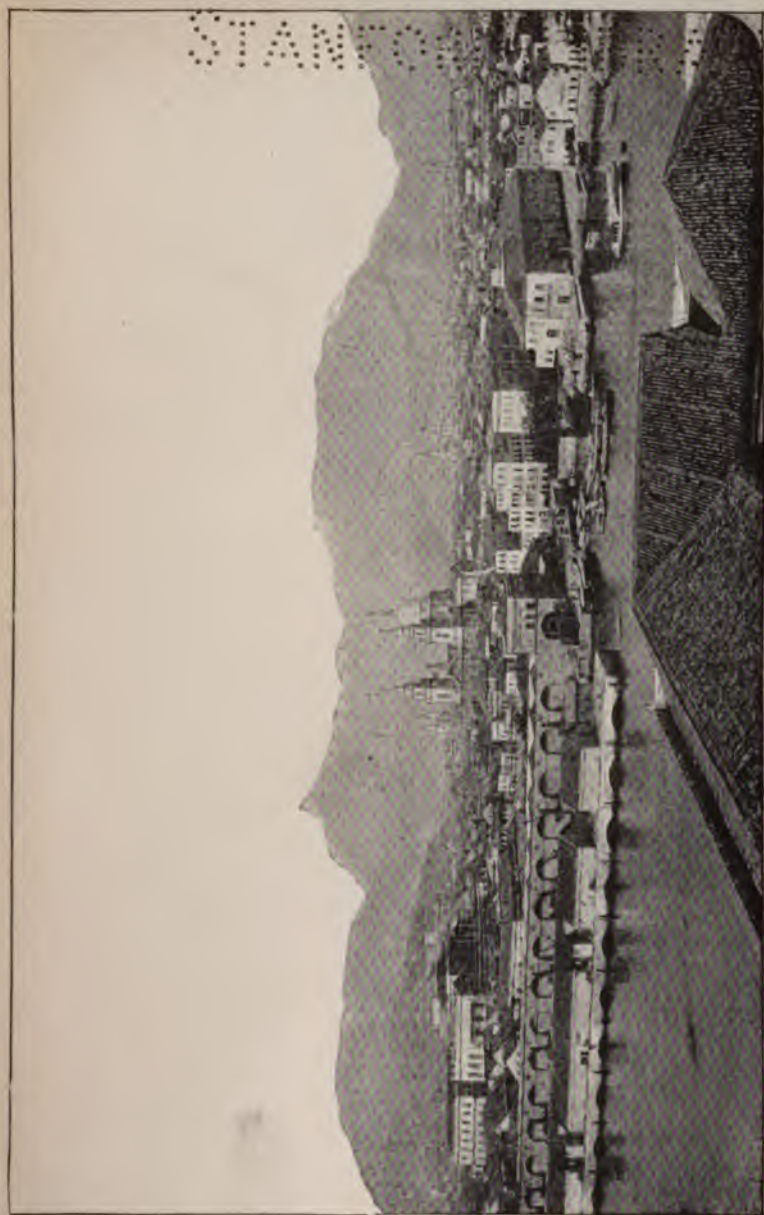
June 28, 1883.—At length I can write to you from dry land, but must begin from the close of my last letter. Yesterday, June 27, I got up at 4 a.m., just as we were off Cabo Frio, which we apparently passed quite close ; it was bright moonlight, and the coast was beautifully mountainous. As we neared the Bay of Rio de Janeiro, before the sun rose, the view became yet more beautiful, range over range appearing through the mist and above the clouds in the increasing light.

The Bay of Rio de Janeiro is generally admitted to be the finest in the world, though some (including the French captain) consider the Bay of San Francisco, in the States, finer. I can hardly think it possible. The entrance to this bay is perfect. Passing two little islands, on the left we see a series of jagged, rugged, irregular, and isolated mountains, beginning with the Sugar-loaf, and backed by the Corcovado group ; while on the right arc range beyond range of much more rounded hills, covered to the summit with verdure and tropical forest. Looking through the entrance, the eye is arrested by the faint fantastic outline of the Organ Mountains, some eight thousand feet high,

rising above a heavy belt of snow-white clouds some sixty miles away. We approach the bay, and the gaunt pyramidal Sugar-loaf (Pão d'Assucar, 1363 feet) towers above us, the gentler slopes of the huge cone are covered with trees, while the perpendicular side towards us is bare and purple in the early sunlight. At its base a white streak shows the sandy beach, which is washed by the calm blue Atlantic. In front of the Sugar-loaf, but detached from it, is a fort perched on a large rock rising above the bay. There is a second fort in the centre of the entrance, and a third on the right side; the latter is likewise overshadowed by a mountain, but much more rounded than the Sugar Loaf.

Entering the bay, one is struck by the beauty of the town of Rio. The coast is exceedingly irregular on both sides of the bay, and picturesquely broken up into many smaller lagoon-like bays. Near the city are some rocky islands dotted over with houses and palm trees. In the midst of the town rise several hills, all more or less thickly covered with houses, while in the flat parts innumerable fine houses, churches, and public buildings attract one's attention; and behind all rises the lofty chain of mountains which, beginning with the precipitous Corcovado, continues in a northerly direction by the Pico do Papagaio, near Tijuca, till it is lost in the mist. It is a scene which cannot be taken in at once or described after one short look; it needs often and repeated gazing at, besides a knowledge of all the places themselves, to be able to describe it properly; but it is certainly very beautiful, and I hope to be able to say something about the different points of view at some future time.

A large number of engineers and other gentlemen came on board to welcome us, including Dr. Rebouças, who is



RIO DE JANEIRO, FROM THE ARSENAL.

STANFORD LIBRARY

considered the De Lesseps of Brazil. They were all dressed in white trousers, broadcloth frock-coats, and black silk hats.

We anchored at 10.30, and came on shore at twelve.

I cannot attempt as yet to describe the town, that must be deferred till I have time to go about a little; but I am much struck by the execrable manner in which the streets are paved all over the heart of the city. To-day has been a very busy day. After coffee at the hotel, I went out for a stroll before breakfast, and walked to one of the squares, the *Largo da Constituição*, meeting crowds of niggers and mulattos—men, women, and children of every shade, from the deepest black to the palest white, carrying sugar-cane, bananas, oranges, and many other fruits and vegetables, also prawns, and fish of various kinds. In the centre of the square is a bronze equestrian statue of Dom Pedro I., the base of the pedestal being surrounded by four bronze groups, representing the typical Indians of the four principal rivers in Brazil—the Amazons, São Francisco, Paraná, and Madeira; beside these groups are eight great gas-lamps. The square is, of course, full of tropical trees, palms, crotons, etc.; and there are many benches in the shade, but it is nothing like the *Passeio Publico*, which is really a most charming garden, though small, in the heart of the town.

After nine o'clock breakfast, we all went together to the Engineers' Club, the New London and Brazilian Bank, and paid several duty calls, passing compliments, shaking hands *ad infinitum*, bowing, and smoking dozens of cigarettes; and then to the *Alfandega*, or Custom House, where we were detained an enormous time, having in all some hundred and fifty packages, fifty of which were instruments, drawing tables and boards, paper and other necessities.

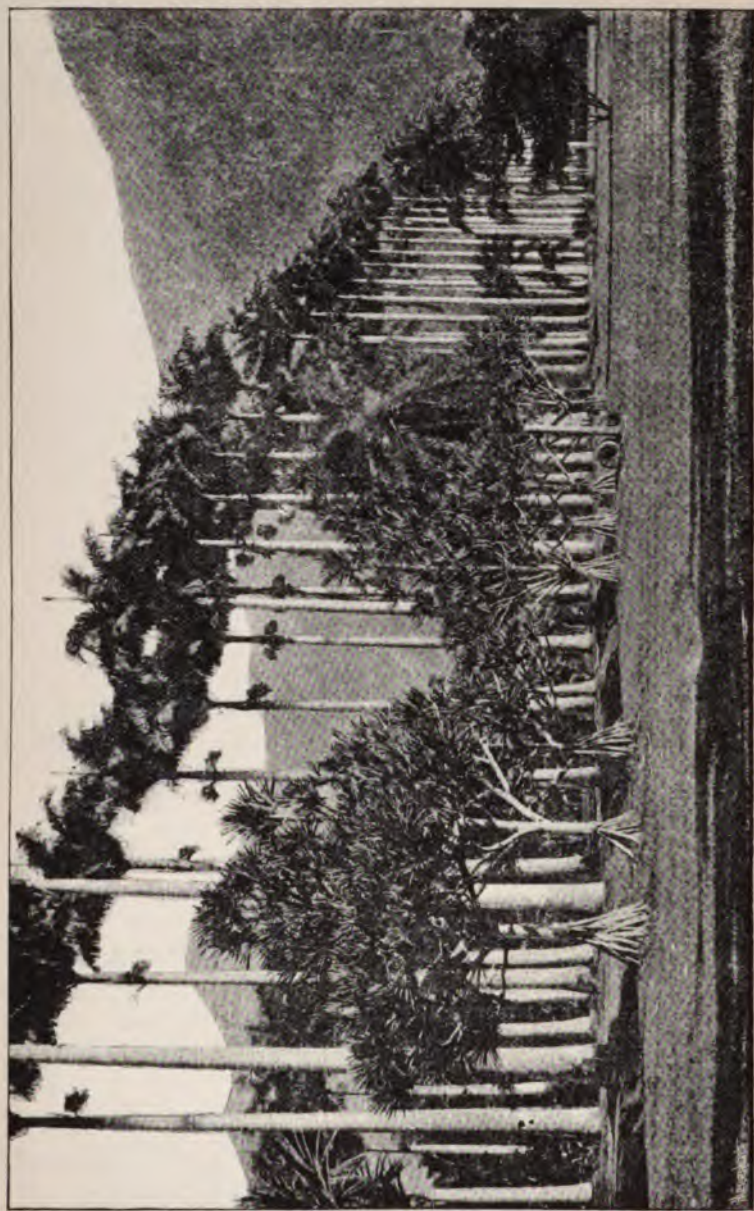
Most of these boxes were opened and examined, soldered up tin cases included ; so that when they came to the personal baggage, they were about sick of the job, and none of my things were searched, as I said they only contained *roupas* (clothes) and other necessities. At least, all the officers were very civil ; and at the end of some hours, when all was concluded, and a good sum paid as duty, after mutual compliments, handshaking, doffing of hats, and cigarettes, we at length departed.

There is an abundant and ubiquitous system of tramways. The cars are drawn by one or two mules, but the roads for them in the city are a disgrace ; and in the narrow streets foot passengers have to squeeze against the houses or go into a shop to avoid being knocked down by the cars, which are mostly open, the seats being in rows facing the mules.

June 29.—Went to the athletic sports to-day, and saw the Emperor. Have to leave to-morrow morning by the five train, so must conclude.

In the train en route to Queluz.

June 30, 1883.—I must begin by a brief allusion to the athletic sports I went to yesterday afternoon at the English cricket ground, near Botafogo. They were really very good. Many of the principal English residents were there, and I was introduced to several. The two races which interested me most were one for little boys, and another for little girls, under twelve. When I had had enough of the sports, I took a car, with some others, to the Botanical Gardens, some three miles further from the town. The road there is quite pretty, passing the Bay of Botafogo and the lagoon Rodriquez de Freitas ; but the most remarkable sight on the route is the view of the precipitous



PALM TREE AVENUE, BOTANICAL GARDENS, RIO DE JANEIRO.

side of the Corcovado from the Largo dos Leões,* where the rock rises a sheer thousand feet above a mass of dense forest.

Decidedly the most interesting feature in these gardens is the triple avenue of lofty palms (*Oreodoxa oleracea*). The avenues are arranged in the shape of a T, and the view I give is of the centre walk—the stem of the T. The palms have a perfectly smooth straight trunk some eighty feet high, crowned by a mass of leaves, each of which is twelve feet long or more; it is all on so large a scale that it was only by seeing some people at a little distance coming down the avenue that I could really take in its height. We next came upon a number of mango and mangrove trees, then some clumps of graceful bamboos forty feet high; after that, orange trees in fruit, the bread-fruit tree, and thousands of plants with splendid and large leaves. Nearly all the trees are covered with epiphytes, orchids, and luxuriant hanging lichens. I noticed some butterflies, *Papilio*, *Callidryas*, *Pieris*, *Ithomiæ*, a few *Erycinidæ*, and others I do not know.

To-day, having set my alarum for 3 a.m., I got up early; not, however, after my usual good night, which is easily accounted for. First, it being the Feast of SS. Peter and Paul, there were innumerable crackers and fireworks of all kinds sent off in the street, which roused me every few moments till midnight; then some men close by started singing in chorus, and kept it up till 4 a.m.; a mosquito also found me out, and was disagreeable, and I discovered in the morning where he came from. Emptying the remains of the water-jug into the basin, I had the pleasure of seeing, besides a lot of muddy sediment, a dozen lively mosquito larvæ!

* Lion Square.

I had to wake up the rest of our party, for though we had told the boots to call us, he never did, and we were only just in time; for at 3.30 our two carriages drove up. They were large, comfortable, and showy, each having two mules, and the coachmen wearing top hats, with a broad gold lace band. There was also a huge covered waggon for the luggage, of which we only had thirty-eight packages, the rest having been sent direct up country from the Custom House. Arriving at the station at 4.20, we were allowed half an hour to enjoy our coffee and bread; the coffee is always excellent, and invariably drunk *noir*, with a large amount of native sugar, which is pale yellow and fine as flour. We left Rio at 5 a.m. punctually, and are now proceeding by the *Estrada de Ferro Dom Pedro II.*—the principal state railway—to the extreme northern limit of the line, which at present is Carandahy.

The engine and carriages are of American make and in American style—the Pullman cars—fitted with every convenience, but being on the bogie principle they oscillate tremendously. I have spent a good deal of the day on the platform at the end of the train—fortunately there is not a guard's van there—looking back at the line, examining the construction, curves, tunnels, bridges, and the general points of engineering interest. The train is going at really a very respectable speed, though it does stop at every station, that is, about every eighteen kilometres.

Since daylight I have been able to admire the scenery, which is most varied and beautiful, very hilly, and in some parts very thickly wooded; but I can give you no idea of the luxuriance of the forests and their intense green. Sometimes we wind along the edge of steep slopes, while below are undulating hills rising out of the snowy mists of

early morning, with plantations of sugar-cane, bananas, coffee, orange trees covered with golden fruit, and innumerable clumps of the lovely bamboo. Then we plunge again into thick masses of virgin forest.

The chief objection to the journey is the dust which rises in clouds, penetrates everywhere, and covers the paper I am writing on. Dr. Rebouças is with us ; he and all the Brazilians travel in long white cotton coats down to their ankles, or else white ponchos, to keep off the dust.

At seven we stopped and had a cup of coffee ; and then at eight, arriving at Barra, we had a good substantial breakfast, mostly obnoxious-looking messes, which, however, tasted very good, and were washed down by some good Portuguese red wine, called *vinho virgem*.

Most of the villages or small towns that we have passed appear well-built, neat, and pretty. The highest point on the line was in a tunnel, when the aneroid showed about one thousand metres above sea level ; this was in the Mantiqueira range, one of the most important watersheds of Brazil. The railway in many places is a triumph of engineering skill ; but it is evident that it is a government line, and has been built regardless of expense.

We reached Carandahy,* Minas Geraes, at 5.30, having been twelve and a half hours travelling 420 kilometres, or an average of just 20 $\frac{1}{10}$ miles per hour. We then walked up the hill to the hotel, which is quite close, and were about ready for the dinner, which did not delay to appear, after having had nothing except a few cups of coffee since 8 a.m. The air felt very cold, and yet the thermometer was 50°. The accommodation, of course, was not very extensive, and an arrival of a dozen travellers more than the average was

* Carandahy is a Tupy (Indian) name, derived from Cara-andahy, the hawk's hook or curve, the name of the river (Captain Burton).

something very unusual ; however, we were allotted three bedrooms for our party. The bedstead frames were iron, with boards to lie on, concealed by half an inch of Indian corn straw, and naught besides save a sheet and a thin coverlet. I slept Brazilian fashion, in trousers, and piled on all the coats and rugs that I had to keep myself warm ; the result was I slept like a top, but when I woke was greeted by sundry groans from my neighbours, who were a mass of bruises, and had not slept a wink, owing to the hard boards.

July 1.—At nine, Dr. Rebouças, his friend Senhor Oliveira, our chief, and I left for Queluz, which is about forty-eight kilometres off (thirty miles). Placing our little luggage on a trolly, we four, with the district engineer, got on, and were pushed along for two or three kilometres by four men, till we fell in with the contractor's engine. We then removed our luggage and got on board it. All round the engine is a narrow platform, with a railing to prevent one being jolted off ; and in front, between the buffers, is a seat, which is more comfortable but less agreeable ; for when the engine pulls up sharp, as it did once when a herd of cows was on the line, the chances are you will be pitched off on your face. We reached the station of Paraopeba at ten, having been an hour travelling eighteen kilometres. After a short conference with some engineers there (having ordered horses to meet us at the end of the rails, and engaged a cart to take the luggage to Queluz), we left at 11.30. The last six or seven kilometres of rails were very rough, and we crawled along and jumped about horribly. At length by midday, reaching the end of the rails, we got on horse-back, riding for the most part along the line, which is almost ready for laying the rails, even beyond Queluz. On the way we met another district engineer, levelling the

formation. He took us up to his house, regaled us with coffee, and lent us a horse to replace one of ours, which was tired. At length we reached Queluz, soon after three. It is really a nice-looking little place, though very straggling. There are three thousand inhabitants, and three churches, but no resident priest. For a change there had been Mass this morning, so of course every one went, and there were dozens of marriages and baptisms. One man was married to the wrong woman, owing to the service being only read once for twenty or thirty persons ; hence some muddle took place, and the result of his anxious inquiry as to whether he can be released and married to the right one is not yet known. He had hold of the right woman's hand, but the certificates were made out with the wrong name.

Arriving at Queluz, we went to the *Hotel Central*, where we were received by some half-dozen engineers ; and, after a slight refreshment, had a long conference about the railway, comparing maps, listening to experiences and details of different proposed routes, and finding out how very little—in fact, nothing—is known about the country between this place and Pitanguy, the proposed terminus of our railway. The chief engineer here is a Senhor Hargreaves. He is a member of the Institution of Civil Engineers, English by parentage, born at Lisbon, brought up at Rio ; he travelled in England and Europe with Dr. Rebouças some ten years ago. He is married, and has three charming children, two boys and a girl, who all look the picture of health. Mr. Hargreaves tells me that the climate here is very healthy, which I can quite understand. Nevertheless, I have to wrap myself up after sunset, though the temperature is not really very low ; it is only the contrast of the cool nights after the hot days. The minimum on June 28 here was 3° C. or 38° Fahr. (It is now mid-winter.)

Mr. Hargreaves most kindly invited us to dinner, and we spent a very delightful evening. He showed me a number of geological specimens of rocks taken from cuttings and tunnels on a line he is constructing to Ouro Preto, the capital of the Province. Some of the specimens were very fine, viz. a beautiful rose-coloured marble, used for walls, which would be worth a good deal if it could be taken to Rio and shipped; some hematite, very pure; some splendid quartz crystals—the Brazilian crystal so extensively used for spectacles; and two fine cubes of iron pyrites, very perfect. He tells me that rattlesnakes are very numerous, some as much as four feet long; but they are not at all dangerous if permanganate of potash be injected hypodermically immediately after the bite is received, as then in two hours you are all right. Armadillos are also plentiful, but only small ones, the larger ones being found more in the north of the province. There are besides pumas, the Brazilian lion, but very small ones;* and likewise plenty of hornets, which can sting a horse or a man to death easily; so we must be cautious.

Estação Paratyba.

July 2.—Our luggage arrived at Queluz at 9 a.m., *only* eighteen hours after ourselves, having been twenty-one hours coming nineteen miles, at the modest cost of eighty milreis (about £6 10s.).

This morning it was very cold and windy, with a thick mist; however, it cleared off when the sun was up, and turned out a beautiful day, not too hot, with plenty of clouds about, but no rain. We shall, in fact, have no rain to speak of for about three months, the rainy season here

* During the whole time I was out I never fell in with any rattlesnakes, never even *heard* of any "pumas," though I was told of "onças."

being from October to March; but no one stops work longer than is absolutely necessary, even during the rains.

We had the usual solid breakfast. There are only two meals a day, as a rule, in Brazil—breakfast and dinner—the first about eleven, and the latter about four; there is no difference between them, except that sweets are not served, as a rule, after breakfast. Coffee comes at the end of each meal, when the wine is removed. After breakfast we went to the engineers' offices, examined plans and sections of the lines and extensions now in course of construction, looked over the best maps that are to be had, and had another long talk. Our party then broke up, I having to return to Carandahy, while my three companions started for Ouro Preto to interview the President of the Province. Ouro Preto is a nine-hours' ride from Queluz.

I left Queluz for Paraopeba station at 12.15, alone with the guide, and the three horses we were taking back, fresh ones being engaged for the Ouro Preto journey. I found my book, "*Colloquial Portuguese*," most useful, and managed to say everything I wanted to my man; though he, presuming on my powers, poured out a great deal I could not quite grasp. Most of the return journey we went the same way as we came yesterday, but followed the mule track for the last few miles, which portion we traversed yesterday on the engine. We passed many ox-carts on the road. From ten to sixteen oxen are yoked to each cart, which only carries about a ton, and they travel two and a half to three leagues a day (ten or twelve miles). The wheels are solid, and the axles keep up the most awful humming screech the whole time, which informs you half a mile off that they are coming; so you have time to get off the road into the forest, or whatever may be at the roadside. The warning is, therefore, useful, because sometimes

the road is sunk six or eight feet below the ordinary surface, so that as there is no room to pass the cart, on meeting it you would have to retrace your steps, for the oxen could not turn round.

Arriving here (Paraopeba) at 4.20, I first presented a letter from Dr. Rebouças to the contractor, Senhor Trajano Machado, asking him to place the engine at my disposal. But it had just gone up the line, and would not be back for an hour. I therefore came over to the hotel, the only *house*, except the engineer's, within miles, and presented another letter to the man who owns this place. I arranged to take four bedrooms and a sitting-room, for fifty milreis a month, and then had some dinner. Macaroni soup, onions, bad sausages, and *feijões* (black beans) failed to satisfy me; so I ordered half a dozen poached eggs, and wound up with preserved pine-apples and cheese—some-what of a mixture! Returning to the station, I found the engine was not available till ten o'clock to-morrow, so came back here, not sorry to have a quiet evening to write home; otherwise the delay is inconvenient, as I have, among other things, to telegraph to London.

July 3.—Left for Carandahy at eleven on the engine. About half-way we came to a place where, owing to a bad foundation, the soil was being cut away from under the rails to put in a dry stone culvert, never expecting the engine in that direction. The pleasing result was that we had to wait three-quarters of an hour, while the rails were being underpinned and made secure, so that we did not reach Carandahy till 1.15; having been two and a quarter hours over eleven miles, and twenty-five hours covering the thirty miles from Queluz!

July 5.—Yesterday the luggage arrived at Carandahy, having been only six days *en route* from Rio de Janeiro!

In the evening I returned to Paraopeba, having passed the whole day hunting up the district engineer, who had promised a train to bring us and all our language *en masse* to this place ; but, after all, I was unable to make arrangements. To-day I have spent five hours in a preliminary exploration of this valley, as I am strongly inclined to make use of it for the railway.* I went on foot, not caring for the expense of a horse, and feeling more free to go anywhere. Everybody who passed apparently thought me insane, for no one walks an inch when they can help it. One thing I already see clearly, that the country is not as easy as was represented, and we shall have our work cut out for us.

I have to-day had my *baptême d'insectes*, in the shape of a delightful little creature called the "carrapato," a kind of tick which burrows its head in your flesh, and has to be dug out with the point of a knife. I also saw one snake, but he glided away from me.

Paraopeba.

July 7.—At length I have found out the real cause of delay. The contractor's engine is supposed not to be powerful enough to bring all our luggage, and there is a bridge near Carandahy which is hardly finished, so that the large engine cannot cross it ; but I now expect we shall all be here together to-morrow. Two of the staff, however, tired of waiting, wished to come up last night, so I arranged for the engine to come down for us about 5.30. A truck was in readiness at 4.30, and we placed our light luggage on it ; the engine arrived at 5.30, but, owing to the usual indifference to delay, we did not leave till 7.30. We three rolled ourselves up on some mat-beds we had bought, and laid in the ballast truck to keep ourselves warm ; but

* The railway is now constructed along this valley (January, 1886).

just before starting, some twenty niggers climbed up on to our truck, so we were closely packed. Soon, however, the sparks from the engine, which only burns wood, were so dense and continuous that we were afraid of our rush-mats being set on fire; therefore, at our first stoppage—for we stopped a dozen times—we rolled them up, and mounted the seat in front of the engine. We came across several cows and horses on the line, which is a common occurrence, and had to pull up quite close to them, blowing the whistle till they moved off. We also stopped to take in water, and again in the middle of a forest for wood. At last we reached this station at 9.30, and, crossing the clearing through a chilly mist, found the house locked up and everybody in bed. We managed to knock them up and get something to eat before turning in, and very glad we were to have left Carandahy. Our bedroom there had two window-frames, both without any glass, one looking on the road, and the other on the general stable, pig, and poultry yard, with the ditch into which we had to empty the slops just under the window. Hardly pleasant, certainly not healthy!

Now, one word as to this "hotel." The owner, yclept Senhor Abailard José da Cunha, some three months since bought a portion of land—about an acre—touching the railway embankment at the station; he paid £30 for it, and forthwith set to work to build this house. He was previously engaged on a fazenda, about three leagues off, where he grew sugar-cane and made rum, the aguardente of the country. However, he thought this would prove a more profitable spec.

This house is a one-story affair, with a neat exterior and clean interior—*because* it is new. The frame is of wood, and, as usual, the walls are bamboo framing filled in with mud,

while the ceilings are of plaited bamboo. As the divisions of the rooms only go up to the ceilings—above which is the roof—of course every sound is heard all over the house. On approaching from outside you see four doors. The two centre entrances open into the bar and shop, where every kind of article required by the Brazilian is obtainable; out of this shop is the store-room, which has also an outer door, and is the end of the house in that direction. The fourth outer door admits to a passage, entering which you see two cupboard-like bedrooms one within the other, which have no light or air, except through the door into the passage. In each of these rooms are two beds. Going down the passage you reach the sitting-room, into which open two small bedrooms, each with only one bed; but that takes up nearly the whole space. These rooms, at least, have outer windows. Leaving the sitting-room, the passage leads to the dining-room, the furniture of which consists of a long table with a bench on either side; and out of this room are three doors, leading to the landlord's private apartments, kitchen, etc. It seems the rule in Brazilian houses to have endless doors to every sitting-room. The cook and butler is a nigger, who always rushes forward each time you come in to shake hands, as if you were the only friend he had in the world. The master stands by the table or leans his elbows on it, keeping his hat on and smoking cigarettes all the time you are eating.

To-day we three went for a walk along the railway towards Queluz, and climbed a hill near the line about five miles from here. The scenery was beautiful—successive ranges of hills to the horizon all round; those to the north, east, south, and west mostly thickly wooded, but from the north to the west comparatively bare (*campos*). Far away to the S.S.E. rose a very faint outline, which, I

believe, are the Organ Mountains. Returning we made a *détour* through a charming forest—my first walk in the midst of a tropical wood—and I enjoyed it much. I did not see many butterflies, but observed two *Pyrameis myrinna*, very similar in appearance to our painted lady (*Pyrameis cardui*), and some fine birds. One had a blue back, white head, and two long remarkable feathers projecting from its tail. On the line we saw a coati tied to a tree. Some of the workmen had caught it that morning, and it was very fierce, but a nice little animal.

The weather by day is perfect—a cloudless sky generally all day, with very hot sun from nine till three, but a cool breeze, then freezing at night. A difference of some 80° to 90° Fahr. between the day and night is rather trying to an English constitution.

July 9.—The chief came up last night with the remainder of the staff and all the luggage, and to-day the *impedimenta* were brought over here in five bullock-cart loads. Some of the tents, which have been pitched on the clearing in front of this house, are occupied by a few of the staff, others being filled with luggage.

CHAPTER III.

PRELIMINARY EXPLORATIONS

Estação Paraopeba.

July 13, 1883.—I returned last night from a three days' expedition, exploring the country for locating the first section of the railway, which is to go as far as Brumado.* I went from here to Brumado ($6\frac{1}{2}$ leagues), thence to Suasuhy ($2\frac{1}{2}$ leagues), returning *viâ* São Amaro (3 leagues) to this place (3 leagues), making fifteen leagues in all, or about sixty-three miles.

Leaving Paraopeba on the 10th inst. at 10 a.m., with one native as my guide, I rode along towards Brumado, taking observations all the way with aneroid and compass to enable me to prepare a sketch map on my return, and indicate the best route (approximately) for the railway. We put up that night at a small hamlet called Serra dos olhos d'Água, about two-thirds of the way to Brumado. As is usual in all the towns and villages here, there is a large wooden cross on the roadside, with a cock at the top; at the foot a representation of the cloth of St. Veronica, and a statuette of the Blessed Virgin Mary; while nailed to the cross are the instruments of the Passion—nails, scourge, hammer, pincers, spear, miniature ladder, etc.

* See map.

We alighted at a hut—I can call it nothing else—with a verandah. After attending to the horses and taking them to pasture, we had dinner at six, which was composed of a few very greasy beef and pork fritters, black beans, mandioca flour (*farinha*)—like sawdust—rice, and cabbage, washed down by sweet white Portuguese wine. We were attended by some really good-looking negresses, and our hostess looked on all the time; the latter had a huge goitre, also a large quid of black tobacco protruding from the corner of her mouth, and she expectorated promiscuously on the floor of our dining-room. The house was lighted up by earthenware lamps shaped like the old Greek and Roman type, with a wick dipped in castor-oil. My “camarade” and I slept in a small room off the verandah—without a window—two bedsteads being the whole furniture; but I must allow that the maize-husk mattresses were the best I have had for a fortnight.

The next morning, after coffee and “cachaça,”* and settling our modest bill, we left at 6.30, reaching Brumado before ten. We went to the house of Senhor João Baptista de Oliveira e Souza, whose acquaintance I had made some days before, when he rode over to Paraopeba to greet us. He received us very kindly, and gave me much information about the neighbourhood, as also a letter of introduction to a gentleman who has a fazenda (farm) a little beyond Suassuhy. While I was at Brumado, a priest came in. He was a jolly sort of man, with a strong tinge of nigger blood, a small tonsure about an inch in diameter, a lace collar, white dust-coat, big black straw hat, grey gloves, and top boots—not exactly one’s idea of a parish priest; moreover, he drank Bass’s beer, the cork drawn by an English patent corkscrew.

* The native rum.

The road to Suassuhy is remarkable for the innumerable "barrancas" or "cañons," which, although tiny in comparison with those of Colorado, are yet very fine. Imagine a track along the top of a gently sloping and undulating ridge of open campo, when suddenly you come to a place where the path dips a little, and has only a slight margin, say with a total width of four or five feet, while on each side there is a huge, deep amphitheatre, from whence the red earth has been washed away by the rains. I saw many of these barrancas in all stages of formation. They begin with a subsidence, caused by the undermining of the ground by springs; the rains then work upon the subsided portion, washing it gradually away, and the cañon increases in size as the sides fall in, so that at length you have a huge area of many acres, in some cases, with more or less precipitous sides, often one hundred to two hundred feet deep, the whole area being intersected by a hundred fantastic knife-shaped ridges and columns of bare red earth. The effect of coming suddenly on one of these chasms in the midst of an extensive grass-covered down is very remarkable.*

The farm where we were to lodge was half an hour's ride off our route, beyond Suassuhy, in a very pretty valley, with numerous clumps of the lovely bamboo; certainly, so far, my favourite of tropical vegetation, not excepting the ferns. We reached the Fazenda Boa Vista at 4.50, and rode into the farmyard, where were two ox-carts, each drawn by ten oxen, loaded with maize, which several slaves were busy removing into a shed. Crossing the yard, we approached the house through a small garden wherein were fan palms, gardenias, etc., and beyond this another walled garden, full of orange trees and bananas

* See Geological notes.

in full fruit. The host was at dinner, to which he immediately gave us a hearty invitation. The food was, as usual, chicken hash—mostly bones—*carne secca* (sun-dried beef), rice, farinha, cheese, and preserved Indian corn made into a sweet. The repast finished, I had a long talk with mine host, after which coffee came in, and with it his wife. I rose and saluted her; she bowed, and begged me to be seated, and then retired. The women are very much secluded here; in fact, I have not yet seen the wife of my landlord at this hotel, though I have heard her through the walls. An old gentleman shared my bedroom at the fazenda. We went to bed at eight, and rose at six next morning. After coffee, and visiting our beasts, and a farewell glass of Schiedam, we left the hospitable roof, taking a youth for a short way to show us the direction to the main road. He left us when we arrived at the bridge across the Rio Paraopeba, whence the guide said he knew—and I thought I could find—the route. The youth intensely appreciated a milreis, which I gave him for attending to the horses and pointing out the road. We reached São Amaro by 10 a.m., and after breakfast and a walk round about left, arriving here, our starting-point, late in the afternoon. During this trip I have only seen one snake (*Cobra coral*) that is dangerous, and a large bird like a small ostrich, called "ciriema." All snakes are called "cobra" here, which is a deception.

One of our party has been attacked by "jiggers" or "chegoes," but only one so far.* I have been attacked by numerous carrapatos, which I believe I caught by hanging my clothes on the bushes when bathing in the river, because in my three-days' ride I have found none.

On the road from São Amaro hither, I passed through

* See note on Insect torments.

some grand forest bordering the river. It is very tantalizing riding through these places so engrossed with compass and barometer, taking directions, heights, locations, general lie of ground and descriptions, as to be compelled to neglect and pass by wonderful plants with brilliant purple, yellow, or scarlet flowers, orchids, creepers, and insects, too numerous to mention. The whole time I am on horseback I have my field-book in my hand, with compass, aneroid, and pencil, and am jotting down notes.

July 15.—I have been very busy the last two days portioning out all the instruments, stationery, etc., among the four sections into which the staff is divided; and among ourselves we have also been exchanging different provisions that we have bought. I, for instance, had two arobas of coffee (about sixty-four pounds, which cost nine milreis), the same amount of sugar (price six milreis), and twenty-five packets of composite candles (150 for fifteen milreis). Part of these I have exchanged for rice, black beans, farinha, and dried cod-fish (*bacalhão*). This latter, though perhaps necessary, I think one of the most disgusting of eatables, and it is very dear. We paid £3 10s. for a barrel containing a gross, and when the cask was opened the odour was intolerable; the fish were "sweating," and had all to be put out in the sun for two days to dry.*

Three bullock-carts with fifty oxen and a dozen men arrived the day before yesterday for the expedition to Pitanguy, but they are so slow they have not yet got off; in fact, the flight of time is absolutely unheeded by

* I could not abide this stuff, and gave it all away subsequently; but I have since heard, at Pernambuco, that when the fish are properly washed (the water being changed two or three times), and then boiled in cocoa-nut milk, they are delicious.

these men, as by most Brazilians. Meanwhile, they add to the picturesqueness of the scene at night, when the brilliant moon shines from the cloudless sky on the clearing surrounded by the dark forest, upon the white and green tents and on the ox-carts ; while her white light contrasts with the ruddy flame of the camp fires, which are surrounded by men sitting on their heels, some roasting and pounding coffee, some cooking their suppers, some smoking, but *all* talking. The sight is rather poetic ; but I fear the men do not feel much romance when they retire under their own ox-carts to sleep in the frosty air, with very little to cover them.

I have been rearranging my luggage, with a crowd of men and boys standing round, who take up and examine everything, criticizing, admiring, or asking questions about the different articles.

Cidade de Entre Rios, Antigo Brumado de Suassuhy.

July 17, 1883.—The bullock-carts with the instruments and luggage of the three sections of the survey beyond Brumado, left Paraopeba on the 15th inst. for this place. I have already told you how these vehicles crawl along, but forgot to mention that when I asked the drivers why they did not oil the wheels to prevent the heart-rending screech, they said that the oxen delighted in it, and would not go without it ; in fact, powdered charcoal is rubbed on the axles to *increase* the noise ! There's no accounting for taste ! Our carts are heavily laden, and always keep together. When they have to descend a stiff hill, some of the oxen are unhitched and yoked to the back, so as to pull against the cart, and prevent its running down quickly. On the other hand, when ascending, two teams are yoked to one cart to pull it up ; it is then left at the top, while the

oxen go down again to bring up the other. You would be surprised if you saw the country, and what are *called* roads. Sometimes one side of the cart is a couple of feet higher than the other, while the next moment the reverse is the case, and it is a wonder there are not often upsets. Although the drivers appear to consider their animals in the matter of affording them sweet music (!), they are fearfully cruel ; even on level ground the oxen are continually goaded, so that their bodies are a mass of wounds and sores, especially on the shoulders ; and when they are pulling *against* the cart (going downhill), the drivers stand in front brandishing their arms, prodding and beating the poor things over the head, eyes, and neck (yelling the whole time), till they tremble and shrink back with fright and pain.

Having sent off our *impedimenta*, and obtained a sufficient number of mules and horses, we all left yesterday morning, most of the staff going off at about nine ; while I remained with the chief, and we were detained an hour and a half. We had a pleasant ride, stopping at 3.30 for some German export beer, and "biscoito de polvilho"—cakes made of the gluten (or raw tapioca) from the mandioca root, very good and nutritious. Our hostess, the woman with the neck, was glad to see me again, and wished us to remain, which was impracticable ; so again mounting, we reached Brumado before seven, and found our companions had only arrived a quarter of an hour earlier. My benevolent friend João Baptista entertained us all right royally at dinner, and placed a house on the opposite side of the street at our disposal.

Brumado (as it is generally called, though there are several places of the same name) is a large *village* of some twelve hundred inhabitants, and has several very good houses. It is dubbed a *city* (*cidade*) after the American

fashion ; but I defer a fuller description for the present. One thing, however, I must mention, which is continually striking me, not only here, but in all the villages, namely, that there is so little cultivation to be seen, and everybody appears to have nothing to do but to lounge about and smoke, while most of the necessaries of life—even food—such as butter, wine, and beer, etc., are imported.

I have now finished the sketch map, which is the result of my three days' expedition, dotting on it a proposed route for the railway, from the Government trunk line to this place.* We have shown it to several of the principal people belonging to this place, who all approve of it. There are, however, other proposed routes which we must look into and examine, selecting the one which appears the best. Of course, length of line and cost have to be taken into consideration.

In the Train.

July 20.—You will be surprised to see that I am again, so soon, *en route* to Rio de Janeiro; but business demands it. I left Brumado in the afternoon of the 18th, and, sleeping in a hut at São Caetano, reached Paraopeba next morning early. There were the usual delays in going on to Carandahy, whither I should have ridden straight but for requiring some luggage. The contractor's two small engines have broken down, and only the "granda machina," as they call an ordinary American engine, is in use. I expected, at least, that we should get along quicker by *it*; but oh no! First we stopped to empty some ballast waggons, twice we pulled up owing to rocks and earth being on the line; and at length, when three miles off Carandahy, we stopped to take up the engineer of the section, who was about to begin dinner, and we had to wait three-quarters

* This proposed route was that which I eventually surveyed.

of an hour for him. Meanwhile, our engine was surrounded by a crowd of navvies, niggers, natives, and Italians, who came, work being over, some with pots and pans to get water for cooking, some to perform their ablutions, it being so much less trouble to get the water from our engine than to walk five minutes further to an impounded streamlet. Sad result! we were again two hours travelling the eleven miles.

When we stopped at Barbacena, at 8 a.m. to-day, having left Carandahy at 6.47, a school of boys, with a master, and a lot of musical instruments, came into the carriage where I am. They have been rending the air with their discordant sounds. Every station we come to they strike up the same tune, besides practising others at intervals, almost without intermission! The noise is abominable, time is ignored, there is very little pretence of an air, and, in fact, they seem to enjoy being out of tune rather than otherwise. Thank goodness! at two, after about six hours' torture, the music ceased. I supposed even *they* had had enough of it for a time.

I have made two purchases since I have been up country, which I think are likely to prove very useful: a white cotton overcoat, in which I am now travelling, to keep off the dust; and a thick native poncho, dark blue, lined with scarlet, with a black velvet collar. I find the latter most useful every evening, as also when sleeping in native huts, or riding early in the morning or late at night.

When the sun set this evening behind the Organ Mountains, we had a truly grand sight, in the midst of the most beautiful scenery on this line (which we could not see coming up on account of the mist). Now, occasional glimpses of a vast depression, full of smaller ridges of hills, all covered with dense forest, and backed by the deep purple

outlines of the lofty Organ Mountains ; then, as we wound down the sharp curves of the line, breaks in other mountains showed us range beyond range of other more distant blue ridges, sometimes to the south, sometimes to the west, while the next moment all disappeared, and we were passing through a hilly forest, with a few thatched huts, surrounded by bananas, and little dusky children playing around, or a whitewashed brown-tiled house in the centre of a clearing, and an occasional waterfall.

Rio de Janeiro.

July 21.—Though the up-country climate is certainly much more healthy than here, I confess I was delighted last evening to find the thermometer 75° Fahr. instead of 35°, and to be able to sleep in the *costume de nuit* of civilization instead of in trousers under any amount of wraps. Such is the remarkable difference that three thousand feet in altitude makes near the Tropic of Capricorn in midwinter corresponding to the end of January with you in England.

I forgot to say I met two of the engineers I had seen at Queluz on my downward journey. The first was at Carandahy, where he arrived the evening I did, coming up country with his wife, five children, and half a dozen slaves. His wife dined with us at *table d'hôte*, kept her elbows on the table the whole time, used knife and fork alternately to convey the food to her mouth, took up the chicken-bones with her fingers to pick, and finally made dexterous use of the "palito" or toothpick.

I have been anxiously awaiting letters from home, but none have arrived. The day I was at Paraopeba, I received one packet from the bank at Rio, but the enclosures were all for the other members of the staff. I now find on

inquiry that *three* packets of letters besides newspapers have been sent to me, and that the *one* I received was the only parcel without enclosures for me. I expected also to hear from the Minister and the Consul in answer to my letters of introduction, which I left before I went up country. I have written to the postmaster at Carandahy, have been to the post-office here, and set on foot numerous inquiries, which I hope will lead to something.*

To-day the streets are crowded by thousands of beggars. They are allowed by law to beg on Saturday, so they boldly enter every shop, and attack all the passers-by, while the church porches are full, as usual, of poor wretches exhibiting ghastly sores to excite sympathy.

Monday, July 23.—Burrell, who came out in the *Coto-pari*, arrived yesterday morning, and took me to church. It is rather barn-like; but the stipend is, I believe, £800 a year, the British Minister giving £400, and twenty firms and banks £20 each. I then went up the inclined plane by invitation to visit Glover at Santa Theresa. He and Burrell live with some other Englishmen in a boarding-house on this hill, which commands one of the finest views of the Bay of Rio that is to be seen from any inhabited spot. We climbed about a little in the afternoon, but the heat was very great; and it rained such deluges the whole evening that I was glad to accept the kindly offer of a bed, and returned this morning very much pleased with my first little excursion here.

July 27.—All my business is completed, but it has been much delayed by having to await the arrival of certain steamers; however, I am off to-morrow. I had really finished most of what was necessary the first day, but have been compelled to spend an hour or two at least each day

* Some of these letters turned up two and a half months afterwards.

in town, though there was really very little to be done. This has prevented my taking any excursions, but I have wandered about the town a good deal, and am beginning to find my way more comfortably. My course of proceeding for the last week has been as follows: rise at 7, coffee; breakfast at 8—this occupies an hour—consisting of two dozen oysters, *rognons sautés*, beefsteak *à la bordelaise*, omelette, bottle of red wine, *guayabá* (guava marmalade) and bananas, coffee; then a smoke and letters. Out from 10 to 5; dinner at 5.30 or 6—soup, fish, *entremet*, *rôti*, bananas, and coffee; then a little stroll, back about 7.30, write business letters, and generally to bed about 8.30. Am roused two or three times during the night by mosquitos or fleas.

One evening I went to the Theatro Imperial de Dom Pedro II., the finest theatre in Rio, and a really splendid building, to see a new piece lately brought over from Italy, and produced under the superintendence of the author; it is now creating a great sensation here, and is called "Excelsior." It is, in fact, the only *true* pantomime I have ever seen, as it is entirely in dumbshow. The *mise en scène* is excellent, the scenery, dresses, etc., superb, and the acting defies criticism. It is supposed to represent the progress of invention and discovery, the fairy Science triumphing over the demons of Ignorance, and is a series of splendidly arranged tableaux.*

The chief fault I have to find with the theatres here is the very long time between the acts, twenty minutes or even longer, when every one goes out and smokes on the balconies in the cool night air; but this results in protracting the entertainment till past midnight.

* "Excelsior" was produced at the Haymarket Theatre in London, 1885, and was a great success.

July 28. — *En route* again. The train is very full. After starting at 5 a.m. I slept till 7.30, but was at first taken aback by the sight of a man seated opposite me with a peculiar eye. While he slept, his head leaning against the cushion, this eye was wide open and glaring at me. Since it has become light, I find it is a glass eye. After breakfast we entered into conversation, and he turns out to be a brother of John the Baptist, who is so very kind to me at Brumado; he is getting out at Juiz de Fora, but before long hopes to return to his home at Brumado.

CHAPTER IV.

RIDE UP COUNTRY.

Paraopeba.

July 29, 1883.—On arriving at Carandahy last night, I went at once to the post-office, but heard no tidings of the missing letters ; then, as the horses were waiting, I started with my camarade, who met me at the hotel, for this place—a long, rather difficult, very lonely and somewhat weird ride, especially when there is no moon, which was the case last night. It is mostly through forest, which in the deathlike stillness of a pitchy dark night has a very gaunt appearance. We were over three hours riding the eleven miles, and arrived here at nine, to find Mr. Bithell, who came over with us in the *Cotopaxi*, and is now looking about for work with us, having nothing particular to do, and I hope he will be successful.* He came up from Rio de Janeiro the day I went down, so passed me in the train, and has been vegetating here ever since, daily expecting my return.

I am now going further up country, as it is necessary to see the chief without delay, and Mr. Bithell is to accompany me, which I am glad of, especially as he can speak the

* He was with us from September until we left Brazil, and was then engaged on the Trans-Andine Railway from Buenos Aires to the Pacific.

language well, having lived in Santa Catherina for five years.

The following letter was handed me last night at Carandahy:—

"To Doctor Dent, Esq.

"SIR,

"As I have some practise of Engenier's employed, for fields works, I beg you, if you please, to take me for your employed on the exploration works, and you could see what I said by this letter I joint to it.

"You may answer me for Carandahy, on the Province Telegraph's Estation.

"I am, sir, wishing you good health,

"Your thank venerator,

"JOSEPH PETER OF REIS."

I told the good fellow I had no prospect of engaging him at present, but would give his letter to the chief.*

I have another charge against the postal authorities. I wrote from Rio to my landlord here on the 21st, telling him not to expect me till he saw me. That letter never arrived. He sent the horses every day to meet me, and finally telegraphed the day before I left to know when I was returning. I wired a reply, and the consequence was that the horses met me when I arrived.

Cajuri, Minas Geraes.

August 5, 1883.—On the 30th ult. we determined to start as early as possible on our week's ride; however, my mule got loose during the night, and after four hours' hunt, she turned up about 10.30. I have not been fortunate so far with my beasts. The chief bought me a horse at

* I never heard any more of him.

Brumado, which I rode back to Paraopeba; he was then ill, suffering from a kind of influenza. While I was at Rio, my camarade dosed him with about twenty different remedies; but, or perhaps consequently, he became so bad that it was impossible to ride him. I was, therefore, compelled to hire a mule. She has, I fear, been infected by my horse, and, after the same preliminary symptoms, has now "come out all over spots, and I think it's something catching" (Sloper). Her hair is all coming off in patches, her face being already quite bald. She is an awful sight. I am ashamed to ride her.

Now to describe our journey so far. Leaving soon after my mule was caught, we rode over those thirty miles of country I am becoming familiar with, and lodged with my good friend Senhor Baptista at Brumado, who, *semper eadem*, received us *à bras ouverts*. Next morning, leaving there after breakfast, we began the ascent to the watershed of the two rivers, Paraopeba and Para, both of which, flowing nearly parallel, are tributaries of the São Francisco.*

On the roadside we came across a small dead tree, on whose branches were perched fifteen orioles (*Cassicus persicus*, Linn.), and the concert produced by their all singing together was beautiful. Like most other birds here, they were very tame, and allowed us to approach quite close before they flew off. They are about the size of a blackbird, with gorgeous yellow and black plumage. At 2 p.m. we reached a hill capped by a great bare white rock, called Pedra Branca, from whence we had a splendid panorama of the hills and mountains, the Serra do Cortume (half-way between Paraopeba and Brumado) being some twenty-five miles to the south-east. The general character of all the hills close to the Pedra Branca is bare,

* Our ride can be traced on the map.

grass-covered, rounded down (*campos*), with occasional cañons; but towards the divide, to the north, are forest-clad hills.

In half an hour we descended to the Fazenda da Pedra Branca, where we had coffee and a trayful of most luscious oranges. A toucan's head was in the porch, which the owner gave me as I admired it, telling me they are very plentiful here. The house, which is over two hundred years old, is exactly the same in its arrangements as all other fazendas; in fact, I believe these country-folk have never changed since their ancestors took possession, a couple of centuries ago. They grow castor-oil (*mamona*), coffee—with which the whole courtyard was covered to dry in the sun—sugar-cane, cotton, and tobacco. There were a lot of cats about, the most miserably small skinny little things I ever saw. One of them was very clever at turning somersaults; she put her head between her front legs, and went head over heels with the gravest look on her face all the time, which amused us much.

After an hour's stay we left, and, passing through some fine forest, arrived at 5.30 on the top of the divide, where three roads meet. There was nothing but bare grass-covered hills to be seen, no indication of the proper road, and not a sign of a human habitation or of any cultivation. We halted to consider our best move. Being just about sunset we were rather anxious, for it was far from pleasant to be overtaken by night, not knowing the road (my camarade never having been beyond Brumado), with nothing to protect us from the cold and heavy dew, and, worse still, without food. We determined to go straight on, and began to descend. In a quarter of an hour we were much relieved to descry a light shining through the deepening darkness, and approaching, we came upon a little farm in a hollow, unseen from the top of the hill.

The owners of the Fazenda do Campo Novo (for so is the place called) received us with the usual kindly welcome which the hospitable Mineiros * generally extend to stray travellers. And while dinner was being prepared, we strolled into the farmyard and examined the milho (Indian corn) stores, where two little puppies were playing about, and a hen, with chickens peeping from under her wings, was settling down for the night. The owner is a widow, who lives here with her two sons—fine lads of sixteen and seventeen; the latter manage the whole work of the farm. They grow sugar-cane, maize (*milho*), and mandioca, and have also a large garden full of orange trees, whence we watched the slaughter of the chicken which was to be part of our evening meal.

This fazenda is one of the less extensive kind; but they are all about equally devoid of any of the comforts or decencies of civilization. The floor throughout is the hard ground; the window-frames are supplied with shutters only, which are closed at night; the rooms have no ceilings except the brown roof tiles, and these are fixed to cross laths lying on the rafters; the partition walls only reach to the level of the wall-plate, on which rest the rafters of the sloping roof, and thus plenty of access for light and air is afforded under the eaves.

I had a room to myself, with a most comfortable mattress of the usual milho spathes. Next morning I woke as it was getting light; all was as yet still, and, opening the shutter, I found it cold and misty. In about five minutes the silence was broken by the cocks crowing, and then the dogs began to bark, chickens to chirp, pigs to grunt, men to talk, and all was suddenly lively again. After coffee, and compelling our benevolent hosts to accept a

* Inhabitants of the province of Minas Geraes.

small remuneration, we rode on to Capella Nova, which we reached in a little more than two hours. I was told that when the orioles sing together, as we heard the other day, it is a sign of rain, which accordingly came this morning, but fortunately very slightly. After descending from the divide some distance, following a stream—one of the feeders of the Para—on rounding the corner of a hill we suddenly came in sight of the village of Capella Nova de Nossa Senhora do Desterro,* perched on the summit of a bare red down, but surrounded by partly cleared forest-clad hills.

Alighting at a poor-looking wineshop, we ordered breakfast. The shop is kept by an Italian, and we met there a priest, likewise Italian, who had come for a wedding, a very disreputable man, with striped blue cotton trousers, a filthy lace collar, and unshaven face. We all had breakfast together in a very dirty little back room, surrounded by the usual crowd of natives looking on ; among them was a very big nigger, who burst into uncontrollable laughter at hearing us speak English to one another.

The village is the poorest looking that I have seen, the street being only some thirty feet wide ; the huts—there are no *houses*—are all only one story ; and there is a small chapel. A few palms, aloes, and cacti are to be seen in the untidy gardens, while a legion of dogs and pigs perambulate the street.

After breakfasting off some roast “paca,” which is an excellent white meat, we went to see a live specimen which had been caught with a young one in a neighbouring wood, where they abound. The paca is a rodent (*Cælogenus fulvus*, Cram.), striped very prettily with fawn colour and white, about the size of a small pig. When hunted it dives into the stream, and on rising to the surface it is shot.

* The New Chapel of Our Lady of the Desert.

Some very pretty basket-work is made here from the pith of a creeper called "sipão," which is dyed different bright colours.

Leaving at midday, we continued our journey, and crossed the Para just below the village; the river then turns abruptly to the left, and, taking a considerable bend, flows far away from the road we travelled. In passing through a forest, Bithell, thinking he would try his shooting powers while riding, fired at a tree with his revolver. The shot glancing off touched my camarade on the shoulder. He yelled a thousand murders, but he—unlike Rufus, both in name, which was Fortunato, and in colour, being dusky—was only frightened, and not hurt in the least.

At 5.15 p.m. we reached the Cidade do Rio de Peixe, and, inquiring as to the whereabouts of the camp of the second section, were informed it was a league and a half away by the Rio Para. We, therefore, hired a guide for two milreis to take us there, and went through the picturesque village which is on the top of a hill. It has very steep streets, and there is much soft white sandstone about. After leaving the church the road descends rapidly, passing through a gorge cut in the white sandstone some eight feet wide by twenty deep, overhung by shrubs and grass, wherein were the nests of humming-birds.

From the summit near the church we had a fine view of the valley of the Rio de Peixe, as far as its junction with the Rio Para, some two leagues and a half distant. At 5.50 we crossed the Rio de Peixe—five hundred feet below the level of the town—then ascended another hill, and in half an hour had reached an altitude of only a hundred feet below the town. At this point, the sun having set, we had a splendid view. All round us, except where the hill we were on hid the view, were numerous ranges of mountains,

mostly undulating, but with one remarkable pyramidal mass standing far above the other hills. We continued descending and ascending alternately, going through swamp and rushes, mandioca and milho fields, and pitchy-dark forests, until at length, about seven, we saw below us the distant glimmering light of a camp fire, and in another quarter of an hour we were distributing a large packet of letters and newspapers among our friends.

We were regaled on ham and cachaça, and then, after a long talk with the chief of section, I turned in for the night on a folding chair, covered by my rug and poncho. After an excellent night's rest, and some tinned beef, cakes, and tea for breakfast, we set off once more, and soon crossed the Rio Para by the Bombassa bridge. It was as ramshackle as all the other bridges I have come across, with hardly any exception. Bridge construction here is generally as follows: longitudinal timbers are laid upon the top of the piles which are driven into the river bed, and on these timbers are placed boughs and sticks—unprepared in any way—while the crevices are filled up with sods. There are no side rails, the footway is always full of holes, and many of the timbers are rotten, and give way under your weight, so that it is always impossible to ride over them; you have to dismount and lead your animals with much coaxing, as they are often frightened to cross. This bridge has a specially broken-down look from not being straight: it extends three-quarters across the river in one direction, and then suddenly bends up stream to the other bank.

An hour later we re-crossed the river by another bridge, which had side railings, but the footway was in a very dangerous condition, and we hardly dared to go over it. At midday a very heavy storm came on, so we were obliged

to seek refuge in a roadside farm, where only women and children, who are always very numerous, were to be seen. A very nice-looking coloured girl, with a child on her hips (the invariable way of carrying children), brought us in coffee, and soon an ox-cart full of milho arrived, accompanied by two men—husband and *père de famille*, and his brother. They were followed by a cart drawn by ten goats, laden with wood. This was the first goat-cart we had seen, but subsequently we fell in with several. While at Capella Nova, a cart passed us drawn by ten rams. These carts are all used for the purpose of carrying fire-wood.

After a pretty good vegetable dinner, the rain having partly ceased, and wishing to push on to better quarters than this poor hut, called Fazenda do Sapecado, could afford, we took our leave and proceeded through the dripping forests along the clay paths—horribly wet and slippery owing to the rain—reaching the Fazenda da Mata, after less than an hour's ride, at 4.30.

The owner, Coronel * João Luiz de Oliveira Campos, of whom we had heard much on the way up, is a great man in every sense of the word, and he fought in the Paraguayan War. He has a wife and two daughters, of whom we only got an occasional glimpse when they were looking at us through a nearly closed door; but his two sons, who were with us most of the evening, are tall, fine-looking, and pleasant lads of about eighteen. We also saw his two little grandchildren, a boy and a girl. All of them are fair-haired and nice-looking. The colonel is a man with a tall commanding figure and presence, very stout, with a long grey beard. He has an extensive estate and many slaves, as

* *Coronel*, = *Anglicè* Colonel, one of many instances, in Portuguese, of the substitution of *r* for *l*; e.g. also *prata* for *plata* = silver.

also hired free men, both black and while, while inside and around the house were crowds of negresses and black children of all ages.

The mode of life here is very patriarchal. One is offered water to wash one's feet. The natives are very hospitable, rushing off to kill fowls and prepare food the moment you arrive. There are also many other customs which remind one of the time of Abraham, but the spell is broken when your Abraham appears—with a flowing beard, it is true, but with a pair of spectacles and a large Inverness cloak !

We had a good dinner, but rather greasy, of pork, with the usual vegetables, washed down by home-made cachaça and water. I can put up with most of the native diet, but have a great repugnance to drinking spirits with food.

Of course the first topic of conversation was the railway, the colonel producing a huge sketch plan which he had made of the whole country round, as far as the divide by Capella Nova, and on which he had traced a line which he considered the best route for the railway—passing through a good deal of his property, and near the fazendas of many of his friends. I promised to explore it on my return.

Our host was very earnest in cautioning us against fire, as the most disastrous conflagrations sometimes occur from carelessness. In 1879 there was a fire here which extended over two thousand square "alqueires" (an alqueire is nearly twelve acres), and burnt up everything. He examined minutely my helmet and porpoise-hide long boots, but said the latter were beyond all reason, because of the breadth of the sole. He told us that the locality is very healthy. There is never any illness, and the people are very long-lived, often attaining a hundred years of age ; one old

woman living near is a hundred and twenty, her husband died many years ago at nearly a hundred.* The colonel has a carpenter, who came in two or three times while we were there; he is seventy-five, but appears no more than sixty, and is a better workman than any of the young men about the place.

After we had finished our dinner, the table was again spread, and all the slaves and farm men came in, in relays, for their evening meal, the feeble flicker of a castor-oil lamp being the only light in the room. We were led off early to our bedroom, passing through two other rooms full of hired men, neither clean nor sweet; but we soon forgot everything in a deep sleep.

Next morning, after coffee, we went to visit the turbine grinding milho, the large shed containing numerous hollowed-out tree-trunks, full of mandioca root steeped in water, and all other apparatus for extracting the poison from the root, and for the preparation of farinha. We also saw the sugar-mills; and on our return observed a number of men busy making an extensive hog-yard, surrounded by a strong stone wall, and paved with huge stones flat on the top. While we were looking on, ten oxen came in, dragging a kind of sleigh, formed of two logs fixed together in a V shape, on which were two large stones and a few smaller pieces, for paving the hog-yard.

We left before nine, the colonel refusing any payment, and thanking us for our visit and intellectual conversation. Proceeding on our way, we rode across two fine valleys, in which were a profusion of palms and tree-ferns. The heavy clouds gradually dispersed, till by midday the sun was very

* I was shown some time later the portrait of an old negress who lives at Pitangny, named Joanna Maria, who is 127 years old, and still does everything for herself.

hot in the cloudless sky. Reaching the summit of a hill, we had a fine view down the valley of the Para for a long distance. This valley, which is thickly wooded near the river, is wide and tortuous, bounded by low hills, mostly covered with grass or scrub. By this time, having only had a cup of coffee, we were longing to discover some kindly shelter where to obtain breakfast, and were, therefore, glad at 12.30 to come across a small house by the roadside.

I had not before seen trees so heavily laden with oranges as were those in the garden round that fazenda, where there were also sugar-cane, castor-oil plants, and gourds. We had a vegetable breakfast, washed down with water, and an hour afterwards left for this place (Cajurú). On the way I remarked many large hanging birds'-nests (*Ostinops cristatus*, Gmel.), made of sticks, as well as those of the João de Barro (*Furnarius rufus*, Gmel.), a light brown bird which builds its nest, shaped like a bee-hive, generally in the fork of a tree. The nest is always made of mud, hence its name (*barro* = mud). We met a man on horseback, who had no hands, only stumps of arms. Of course, he begged.* I cannot understand how he managed to ride, but he manipulated the reins somehow between the stumps. We passed a tile factory, the only one I have yet seen, though all the houses and most of the huts are roofed with tiles. The price at the works is thirty milreis per thousand, whereas at Paraopeba they are from forty-five to fifty milreis. Though these tiles are baked in a kiln, they are not nearly so hard as ours at home; in fact, they break easily, and are very crumbly.

We arrived here (Cajurú) at 5 p.m., August 3, and

* A real "beggar on horseback." I know an example in England of a gentleman who had neither arms nor legs, but was a splendid rider.

were met in the town by an old gentleman, who invited us to stay with him. He took us home and introduced us to his wife and two pretty daughters, who sat on a bench opposite us while we were eating a vegetable dinner ; and behind them was a group of giggling black servant-girls. The old man meanwhile took his long knife from under his arm and prepared a cigarette. I have not yet mentioned that every man and boy carries a knife, with a blade from nine to twelve inches long, in a case ; those who wear waistcoats place it in the armhole, hanging inside the vest ; and those who have none carry it in their belt. These knives are very useful, and mine host, who keeps a general shop, recommended me to buy one, saying it would do for anything, from killing a pig to cutting bread and cheese, or the palha (maize leaf) for a cigarette. The natives make their cigarettes in milho straw, and they have always a supply of the leaves which enclose the ear of the milho ; these they scrape and cut into shape, and stow away, sometimes behind their ears, sometimes inside their hats, so that they are ready at any moment to squat down, take out a couple of inches of "twist" tobacco, cut it up, "rub it out of the flake," and roll it up in a straw into a cigarette.

Our host, who is a capitão (captain) in the army, was much excited about the railway, and longing for its construction. He said that though now there is a fair export, considering the dearth of transport, when the railway is open the incentive to production will be much greater, and the exports could be increased to any extent. The country all round is very rich, and produces coffee, sugar, cachaça, rice, milho, beans, carne secca,* pigs, castor-oil, and "farinha de mandioca," which are carried down to the rail-

* Sun-dried beef.

ways at Barbacena and S. João del Rey. Cajurú is the centre of about forty districts and villages, within six or seven leagues, which supply a great portion of the exports of the S. João del Rey Railway. These districts will be tapped by our railway, which will probably take three-quarters of the traffic away from the little line. A great saving will also be effected in cost of transit, as S. João del Rey is over one hundred miles away, and cartage is very costly. That railway now imports from eighty thousand to ninety thousand sacks of salt annually, of which a great portion comes in this direction, and its cost here is double the price it is at Rio de Janeiro. The captain was so engrossed with his subject that when he showed us to our bedroom he came in and stood a long time talking of the coming railway.

August 4—The painful screech of a passing ox-cart woke us at 6.30, and we "fell to" with coffee and "pipoca" (fried pop-corn). Fortunately our host asked whether we would breakfast before we started—which is unusual, as you are supposed to depart after coffee—and as we had not the faintest idea where or when we should get any food, we accepted with joy. While waiting, I bought half a metre of tobacco, which was rolled on a reel like rope at an English oilman's, and is sold by lengths!

Our host, who is a sturdy Liberal, began conversing on politics, and mentioned the names of Lord Palmerston, Mr. Gladstone, and Lord Russell. I told him the Conservatives are very strong in England, as he appeared to think they form quite an insignificant and inconsiderable party. It was well we had something to draw away our attention from the breakfast, for it was not sumptuous—eggs, pork, and marmalade (made of *marmello* = quince). The pork in this province is always disgusting, being cut into small

lumps and fried black in its own fat. The only variety is in the size of the lumps.

The meal concluded, we set off in search of the camp of the third section, and after a ride of two hours and a half we saw through a gate the top of one of the tents we were in search of, and, crossing a level pasture, alighted, leaving our horses to a man at the tents while we went along the "picadas" (the path cut through the forest and brush) by the side of the river Para, until we came across our friends at work. Owing to information I received from them, I determined to return to Cajurú; and so, leaving the camp, just before sunset, we rode back in two hours in the dark, having had nothing to eat since we left in the morning. Right glad were we, therefore, even of a vegetable supper, which was all we could get, being long past cooking hours, and the natives consider that a plate of black beans with farinha, and perhaps rice, is enough for any one.

To-day—August 5—being Sunday, the country folk began early to arrive from all round the neighbourhood for Mass. Some come ten or twelve miles every Sunday, and the same distance back in the evening. The women and girls were very picturesque, with black hair, fine eyes, and brilliant shawls. One of the first I saw come in was a white woman in a bright green dress, on horseback, with a child in front of her; she was followed by a negress in a red gown, who rode a mule, and had one child in front and another behind. The men were in their Sunday best—black coats, clean white unstarched shirts, and cotton trousers, which look like bed-ticking; some with buff-coloured or black long boots, some without, but all with spurs, which have rowels an inch or an inch and a half in diameter. Fortunately for their animals, they are not sharp.

As we were going into church, the priest bowed to us. The service, which was at midday, was called a *Missa Cantata*; but the choral part consisted merely of a brass band, which struck up dance music, with much drum accompaniment, at the most solemn parts of the Liturgy. After the Gospel and Creed, the priest gave a very good little sermon on the Good Samaritan, with practical directions as to entertaining strangers—I suppose with special reference to us; and I must repeat that, without exception, this direction appears to be obeyed to the very fullest extent, which I am afraid I could hardly say of our own country.

After service, we dropped into a shop to have some wine. It turned out to be the house of the priest's father; and the "*padre*" immediately came from an inner room, asked us to join his humble dinner, and gave us some more of the wine, as we had praised it. Dinner ended, he led us off to his own house, and made me rest in a very comfortable palm-fibre (*burity*) hammock, which was stretched across his study. He has a nice, though small, library of religious books, and a few sacred pictures. In one corner stood a cask of some especially good wine, which I need hardly say he pressed upon us. We had heard that he was a very devoted and excellent man, a widower, who had kept a shop. On his wife's death he sold up his shop and went away to college, leaving a little daughter, his only child, with his mother, and in due course was sent back as priest to his old home. He told us what a great struggle he had had, and something of the work he had done among the people for some years; and we heard that when he had first arrived, the people were very wild, and went to church with their long knives and other weapons, brandishing them like savages. Now they are as quiet as English people, and

generally much more reverent in church than the great majority of English congregations. The priest said the people were suspicious of every one unless he took them up, and certainly, after walking through the town arm-in-arm with his reverence, we were treated with more respect. Our host, the captain, having desired our attendance at dinner, we went off to him at four, and feasted on "canjica" or boiled maize, and "mocata" or rice and cow-heels. After this repast we went to the priest's house to spend the evening.

Paraopeba.

August 14.—To conclude the account of my ride up country. I told you of the Sunday (August 5) we spent at Cajurú, mostly under the roof of the excellent priest, to whom I took a great liking. He is of an amiable and gentle disposition, with a very calm and pleasant face, though he can be stern when necessary; he is pretty well read, can talk very pleasantly, and is not a bigot.

August 6, Monday.—We left about eight to ride to São Gonçalo. When just leaving Cajurú, I remarked a woman with a full water-pot on her head, who had the biggest goitre I have ever seen; it hung down from her throat at least six inches on either side. The people about here appear greatly afflicted by these goitres, but, so far as I have seen, only the women, and not the men.*

In a little under two hours and a half we reached the Fazenda Fructuoso, at the end of the third section, and not far from the camp we visited on Saturday. The family were just sitting down to breakfast, and, after the usual invitation to alight, we were requested to assist at the meal, and a capital one it was; I never had a better—chicken, sucking-pig, with the usual *etceteras*, and "aipim," a kind of

* In other localities I have seen both sexes with goitres.

yam, which when boiled is not unlike mealy potatoes. There was a shoemaker at breakfast who was much exercised about my long boots and the extremely broad soles, and he was especially surprised when I told him they were porpoise hide, made from the skin of a fish (*golfinho*, in Portuguese) ; such a thing he had never heard of. The owner of the fazenda is of Indian descent, and is said to be rather grasping ; but his wife is very nice ; he also was very civil, and refused any payment for the breakfasts of our three selves and the horses.

Leaving this hospitable house at midday, we travelled for three hours, and then reached São Gonçalo do Para. This village is charmingly situated on a hill, which is the general rule ; but, though rather large, it is a very poor place, composed almost entirely of mud huts, with the exception of two or three houses ; and the children, both black and white, go about with scanty attire, either a little shirt or nature's garb. The churchyard there, as at Cajurú, is on a hill, and surrounded by sixteen crosses, which are supposed to keep off evil spirits. The sight it presents is curious, being a large square bare plot, encompassed by a wall, without any gravestones, but with these numerous crosses all round, each ten or twelve feet high.

The village possesses four wine-shops, which are also general dealers, one apothecary's shop, and one sort of haberdashery store. We stopped at the last wine-shop near the end of the village, and had some wine, mandioca biscuits, and coffee, after which we left for Pitanguy ; but before we had ridden for half an hour, we met the pack-mules, camarades, and a spare horse belonging to the chief, and heard that he was intending to sleep at São Gonçalo, and put up at the above-named apothecary's. We, therefore, returned to the village to await his arrival. In a quarter of

an hour the bedroom allotted to us, which opened into the street, was full of about twenty men and boys, all come to examine us, as if we were wild beasts. Presently the priest came to pay his respects, and then we retired to a back place for dinner, after which we held another *séance* for the lads who wished to see the strangers. At 7 p.m. the chief arrived, and after his dinner and a little rest, and paying a short visit, we had a long talk about business till three next morning.

August 7.—After breakfast we started, a party of eleven, for a ride to examine a proposed alternative route for the line, leaving the bank of the river, which is some distance off, in order to pass near the town. When going over a rotten bridge soon after the ride began, the front left foot of the last horse went through the bridge. He rolled over into the stream, and a stick entered one of his eyes, nearly blinding him. Fortunately, we were all leading our horses, otherwise the rider would probably have been killed. As it happened, the horse emerged on the wrong side of the stream, and much time was lost getting him across again. After riding about four miles, at a good pace for a wonder, we came to a fazenda and sugar-mill on the bank of the Para, where we had coffee. I gathered a species of *Datura*, and we then rode across country to a valley where there is a fine "cachoeira" (waterfall); the stream falls about one hundred feet over a rounded face of rock, which stands at an angle of some forty-five degrees. On the rocks we saw a bull which had evidently fallen over a little cliff, and appeared to be much injured; so we went to the nearest hut we could find, and told the inmates of the accident. After a most enjoyable day and capital ride, we returned to São Gonçalo at 4.30.

On alighting I saw an armadillo-baiting in the street

just opposite where I was staying. It had been caught that afternoon in the priest's garden, and being of the hairy, uneatable kind, which, with its long claws, digs up graves to indulge its ghoulish propensities, it was sentenced to a painful and cruel death, by being gradually torn to pieces by dogs. Poor beast ! At length, by my request, he was despatched ; but only after all the bones which could be got at under his armour-plated shell had been broken by the dogs, and he was bleeding from a hundred bites. After all, he only followed his instincts in disposing of buried carcasses ; he could not distinguish between a Christian body or an ox's carcass, and we will hope he has a happier future state, as the Rev. J. G. Wood so strongly and ably sets forth in his work, " Man and Beast, Here and Hereafter." While musing thus, I may also refer to the patient oxen, of which hundreds of thousands every day are tortured by their native drivers, while dragging the heavy carts with great toil and labour up and down those fearful hills, over the merest apologies for roads. When putting forth the utmost of their strength, they are beaten, and prodded, and pulled about as if their poor yoke-laden necks were made of iron. May we not hope that they too, after their present life of endless toil and suffering, may enjoy a future state of rest and peace ? It is at least a beautiful thought, and I do not see that man's prerogative as the highest of all created beings, both physically and intellectually, suffers aught by admitting the lower animals to a future condition of compensation for the ills they undergo in the present life—a life too often embittered by the thoughtless, and, alas ! also frequently by the wanton, cruelty of those who are termed " the lords of creation."

But such is the strength of prejudice or of instruction, that the priest, a man of remarkable gentleness and bene-

volence, and whose whole life is a constant self-sacrifice for the good of others, looked on without a word of reproof, while the poor armadillo was vainly endeavouring to escape from the dogs, whose jowls were reeking with his life's blood. Perhaps the padre thought it was a fitting retribution on one who had violated the quiet resting-places of good Christians.

Just after a knife, skilfully driven home, had deprived the poor armadillo of the little life that yet remained, the six o'clock bell sounded, our priest took off his hat, and all surrounding him did the same, while his lips moved, uttering inaudibly the prayers appointed by the Roman Church for that hour.

After dinner the padre came to invite us over to his house, and we went all round his garden in the little light that remained before sunset. The garden is large and full of coffee, sugar-cane, castor-oil, orange trees, yams, bananas, mandioca, and medicinal herbs. He has a nursery of plants, with gifts from which he constantly helps the poorer members of his flock to stock their gardens, free of expense. There are many little irrigating canals supplied from a stream running through his garden, and also a fine spring conducted through a good bath, which, wonderful to relate, he makes use of every day. He gave us coffee, white wine, and "mamath," which is a kind of fermented sponge cake, besides other delicacies. We talked of the country and neighbourhood, and also of his parish, which is very extensive, some villages being four leagues off (sixteen miles). The total population of the "povoada," or parish, is about three thousand. He spoke of the extreme beauty of the valley of the Rio São Francisco, into which the Rio Para empties itself, about seven leagues below Pitanguy. The valley of the São Francisco is very wide, in some parts

being as much as three leagues ; it is densely wooded, and abounds in wild animals.

This priest interested me much ; I was charmed with him. In fact, the two priests of Cajurú and São Gonçalo were both most amiable men, though of very different temperaments ; the former somewhat jovial, middle aged, and a widower, with a nice little daughter of fourteen ; the latter very young, quiet almost to sadness, and more reticent. Both alike are hard workers, very much beloved by their people, and have done much good, very different to that Italian priest I met at Capella Nova, of whom no one said a good word, and whom I disliked, while his conversation was the reverse of profitable.

The priest at São Gonçalo, Padre Hippolyto de Oliveira Campos, has, besides his large garden (containing a lake, on which he paddles about in a canoe), a large roomy house, with some very break-neck log-steps leading from a verandah into the garden. The house is of two stories, and the rooms are large and lofty ; most of them are unfurnished, and the remainder have very little furniture to boast of. His bedroom has a ceiling, and whitewashed walls, on which hang some very good sacred oleographs and other devotional pictures. He has also a small but comprehensive library of religious books. While sitting in his room, our privacy was invaded by many men and boys, who came in uninvited, as is the custom of the country, and, sitting down, smoked cigarettes in silence.

Next morning, after breakfast, when we had some delicious "palmita," or boiled cabbage-palm, and "pirão," which was an *olha podrida*, or untold mixture, we went to bid adieu to our good priest. He was in bed unwell, but received us very kindly, and bade us "boa viagem." We then left at 9.45, and repaired once more to the Fazenda Frutuosa.

I must say it was with the very greatest regret that I began to retrace my steps; but work had to be done. I was sorry to be unable even to reach Pitanguy, only seven leagues further, and I heard most glowing accounts of that city of about three thousand inhabitants, and of the kindness of the people there. Besides, there are to be seen the tapir, "capivara," or water-hog, anacondas twenty metres long, boa constrictors, and the onça, or yellow leopard. It was very tantalizing, too, after having gone so far, to hear of the really wild parts on the Rio São Francisco—that is to say, wild as far as animals are concerned, for Indians are not within ten days' ride—and then to have to return to the tame and comparatively civilized regions.

However, at the Fazenda Frutuosa we were received with open arms, and the kind hostess, who had taken quite a fancy to me, bewildered me by offering cachaça under the names of "corneo," "samba," and "ristiro," or "ristillo." The whole household, with a dozen female slaves, were busy picking and winnowing Indian corn. Our hostess gave us some excellent Tangerinas de terra (small lemons), looking exactly like oranges. She then led me into a back room, and gave me some water and "ristiri" to wash in. This is the first time I have used F. M——'s recipe; you may remember he told me never to wash without putting a little spirit into the water. I certainly found it refreshing, but the smell of spirit is so obnoxious I could never use it as a rule. She then took me into their bedroom, away from the others, where were some ladies and children. We had a little confab, and she brought out a bottle of special liquor for my benefit, which was not unacceptable. We were then treated to coffee and hot cakes, after which we again visited the camp, finally reaching Cajurú about six.

After dinner we went to see the priest. He was at his

parents', so we adjourned there, and were entertained with music (guitar, trombone, and concertina) and songs to the guitar, and we passed a very pleasant evening. I took the opportunity of asking the reverend gentleman why they had no sacred music, only dance music in church; he said the people were not educated up to it yet, but he hoped in time to introduce it.

The following morning, after taking leave of the priest, and our host the captain, we rode off about ten. Traveling by a rather different route to that we had come up by, we called a halt at 3.30 for half an hour to rest the horses and have some lunch. We stopped opposite a nigger's hut, where there were only three women and some children at home. We gave them some cheese, and a little boy then brought us a calabash full of small fish, and also one large one. We presented the little fellow with two hundred reis (fourpence), with which they were very pleased. They told us that their way of catching fish is to pour some poison into the stream; this kills the fish, which float on the surface. I did not much care for the idea of eating poisoned fish, but did so, and derived no harm from it. Were it injurious, of course the natives, who only make use of the poison to supply themselves with food, would choose some other method.

In one of the fine valleys full of palms, on the way to the Fazenda da Mata, we came across fourteen "urubus" (*Cathartes urubitinga*, Pelz., a black vulture larger than a turkey) all perched on one dead tree.

I was rather reluctant to take such a large party—for we numbered nine men and thirteen animals—to claim the hospitality of the gallant colonel of the Fazenda da Mata; but there being no other place we could shelter in, we were compelled to go there, and he received us with as much

empressement as if we were his oldest friends, and did not appear the least disturbed at the size of our caravan. He, of course, talked long and eloquently about his route for the railway, which we promised to go over the next day. The principal produce of his farm besides maize is cotton, of which he sends four hundred arobas (13,094½ lbs.) yearly to São João del Rey, whence it goes to all parts, as the southern portions of the province do not produce much. He also grows grapes, and makes wine, which he sells at eight milreis (about 13s. 4d. to 14s. 8d.) per "barril" of twenty-one litres, including the cask.

By the way, speaking of "going to all parts," I asked a man the other day where a certain road led to; he answered, "Well, first to Barbacena, then to the whole world."

August 10.—We left the fazenda at about ten, having first insisted on the colonel receiving payment for the maize our beasts had eaten, and after much pressing he took ten milreis. In about two hours we reached the old camping-ground of the second section, and found the tents removed, so we had to ride or walk through the "picadas" (lines cut through the woods) till we came across the party at three p.m. After a long talk we returned a distance of two leagues to the "city" of Rio de Peixe, reaching at length the same path from which I saw the fine sunset on my first journey.

Arrived at the village, we put up at a small house owned by a gigantic nigger, where the accommodation was nothing remarkable, but the food was excellent; and after dinner we went up town to pay visits and gather opinions on the colonel's proposed route; the general feeling seemed rather opposed to it.

August 11.—Having obtained a guide, we set off at ten

to explore the newly proposed Peixe Valley route. Our guide was an elderly grey-haired man, but very strong and sturdy; he was on foot, and shoeless, but he set out at a rapid though steady pace, which he kept up the whole distance to Capella Nova. He often goes about as a courier, carrying letters and money, and is always on foot and alone.

Just after leaving Rio de Peixe, we met a party of thirteen men, women, and children on horseback, going to a wedding; and I must confess the bride did not look over joyful. We rested on the way and had some delicious red lemons, while we watched some niggers uprooting yams and mandioca. In one of the forests we saw a "sagui" or marmoset, a lovely little brown creature. We arrived at Capella Nova at 3.45, after a very pleasant ride; but, as we expected, did not find the colonel's route a good track for the railway. It would require several tunnels, besides ascending and descending grades of a far greater percentage than could possibly be employed, so there was no need to go over it with an instrument.

Arrived at Capella Nova, as there was no house large enough to receive us all, we divided into two parties. My division did not alight at the Italian's where I stayed the last time, but at another wine-shop. I had my dinner in public on the shop counter, and then had to make peace with my former host by telling him I wished to divide my custom.

We were given an old cabin to sleep in. I went to see it, and refused to stay there; it was too frightfully dirty. I then went and took possession of a new unfurnished house—the chief lent me a cork mattress—and, with my saddle-bags for a pillow, and my old rug and poncho for coverings, passed a most beautiful night, going to bed at 8.30.

The next morning we were up early, but did not get away till ten. I saw a pig running along the street with a huge triangular piece of skin, some three inches long, hanging down, torn off his back. I suppose he had been caught by some of the fearfully strong thorns which abound. Poor brute! At 2 p.m., having crossed the divide and examined the bare downs for the best point for the crossing of the line, passing through a dense forest we reached a fazenda, outside which we sat by the side of a stream for lunch. We tried to go inside the fazenda, but the men were all out and we got into the midst of some thousands of bees which were swarming on the verandah, so we thought it better to beat a retreat. I was tantalized by seeing some huge *Papilios* (*P. Thoas*), *Erycinidæ*, *Pieridæ*, *Callidryas*, and other lovely butterflies settling on the damp earth beside the stream; but, not having my net at hand, had to be content with watching them. We then rode along by a different route to the one I had travelled by before, and, leaving the Pedra Branca far to the right, arrived at Brumado at 5.45, sleeping, as usual, at the house of Senhor João Baptista, who received us with his unfailing genial and importunate kindness.

The next day, August 13, we rode to Paraopeba, and put up in our rooms at the hotel or inn near the station.

Thus ended my fortnight's trip up country, which was most enjoyable in every way, both from the pleasure of seeing the country and from the universal kindness of all those I came across, and it will be long ere I shall forget it.

CHAPTER V.

I START ON CAMP LIFE.

In camp, on the Serra do Cortume, near Casa Grande.

August 18, 1883.—At length I am in camp. On the 15th the bullock-cart arrived to take the *impedimenta* of the first section to some place in this neighbourhood, which I had to fix upon, and I was very busy distributing all our luggage, instruments, etc., into three lots—one to remain in our rooms at Paraopeba, the second to go to camp, the third to be conveyed by the bullock-cart to Brumado. The cart was sent on ahead the same day, and I left early the next morning, riding alone, as the men I had engaged all seemed either unable or unwilling to depart till the next day. I saw *en route* one ciriema (*Cariama cristata*) and one humming-bird, and nothing else remarkable.

After about three hours' ride, I was joined by my future cook, Antonio by name, when I was approaching Casa Grande. This village is a very straggling affair, consisting of a few small squalid houses, huts, and cabins scattered at intervals for about a couple of miles at the side of the road; there is no church or chapel, and only one small general shop. This apology for a village ends opposite my camp, just before the ascent to the divide.

Having given instructions for the ox-cart to stop near

this place, we found it on our arrival, and, choosing a spot, we began to pitch camp, unloading the baggage with the help of two of the villagers and some boys. In an hour we had fixed up the two tents. Ours is ten feet square; the luggage tent, which the men will also use, is circular, twenty feet in diameter.

Our camp is some two hundred yards from the road, on the grassy slope of a hill in a small side valley. There is a good stream of pure water just below us. I sent Antonio for fowls, while I fetched water and built a fire to prepare some dinner; but at 6 p.m. one of the men who had assisted us in pitching camp came to invite us to dine at his hut. We accepted, and were joined by my former camarade Fortunato, who had just arrived, being now employed as courier to the staff.

The benevolent villager, yclept Aleixo Tavares de Carvalho, gave us an excellent dinner of fowls, etc., laid out on a vacant bedstead, his wife and four small children serving us. He refused payment, saying it is his duty to entertain strangers. I was sorry, as he appears poor; but he is to supply us with fowls and other things. After dinner we returned to camp, and an elder son, another Antonio, who had been keeping guard, went home, only, however, to return before long with his father to have a long talk; but I left them principally to the camarades. Rolling myself up in my poncho and rug, I laid down on a couple of rush mats, with my revolver under the satchel that formed my pillow, and was asleep in a minute.

The fire was lit early next morning, and I made some coffee (from condensed extract) and soup (from a tablet of *riz au gras julienne* and Brand's essence) for the benefit of the courier, who had to go off early, as well as for ourselves; then the man prepared breakfast, which consisted

of the remains of the soup, a chicken, some "toucinho" (salt pork), and farinha.

After breakfast I went out on one of the ridges to explore, but before long, seeing a storm coming up from the north, had to rush back, and reached the tent just in time to avoid a drenching. The thunder over the wooded range of the Serra do Cortume was very heavy, and accompanied by a terrific deluge; but it passed off in an hour, and the sun shone out again with his delightful warmth.

The only insects that have found me out at present are numberless red ants, with remarkably large heads and powerful mandibles, called cabeçudo; also the usual carapatos; and I have seen several fireflies.

The canteen I bought at Silver's is most useful; in fact, at present it forms the whole of my cooking apparatus.

August 20.—Just after the storm on the 17th, the rest of my party arrived, bringing letters and newspapers from England up to the 16th of July, dated Rio, August 10th. Much time is lost in the transit of letters up country when they leave the railway.

On the 18th I went exploring, taking men with "machado" (axe) and "faucos" (bill-hooks), while I had "facão" (long knife), aneroid, compass, etc. But I must now explain why I begin work here instead of at either end.

Having settled upon the general line of route to be surveyed from the Government Trunk Railway (the E. F. Dom Pedro II.) to Brumado, which line, after careful examination and consideration of some six other proposed routes, appears certainly the shortest and most convenient; I have now to determine whether it is also the most practicable and cheapest, as there is one point nearly half-way that may be troublesome, owing to our being compelled to

pass over a certain ridge forming a portion of a large clump of rounded hills, called the Serra do Cortume, which rise to a height of about five thousand feet. I have, therefore, come to this place to find out whether I can get workable ascending and descending grades.

The result of the day's work was that, after going about for some hours and a good deal of wood-cutting, I found the lowest point of the ridge, and on returning to camp I made a detailed sketch plan, by which I am glad to find the route marked on my original rough outline map is certainly the best ; so now it only remains to go over it with the level.*

August 19th being Sunday, some of my men went over with me to São Amaro, which is some eight miles off, to attend the service, as a propitious beginning to the regular work of to-day (August 20th). I enjoyed the charming ride much ; the service was quiet and reverent, and the priest gave a good sermon on "Bring forth, therefore, fruits meet for repentance." The church was crowded, and after service we were entertained at the house of one of my men (Arturo) who lives there.

Camp No. 2.

August 26.—I have now had a week of good work, but unfortunately lost one day owing to having to change camp. The reason was this. A few days ago a case of small-pox broke out in a cottage about five minutes' walk above us ; it was a man who had come home from a distance. I thought we were pretty safe, but finding the people from that cottage washed their clothes in the stream we drank from, ordered the men to fetch the water from a source

* The grades worked out satisfactorily without any heavy cutting, and the detailed plans and sections were approved of and passed by the President of the Province early in 1884. Construction began January 6, 1885.



SERRA DO CORTUME (LOOKING NORTH-WEST FROM CAMP NO. 2).

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urther away. I found out next day that, to save trouble, they were still using the original stream, and then a sort of panic arose. So I had to shift camp, and, fortunately, this is a much better site in every respect—in another small valley concealed from the road by bushes, and more picturesque, though not five minutes' walk over the brow from the old camp. Now to resume my journal.

August 22.—The place where my line crosses the divide is a low ridge (1012 m., or 3329 ft.), from the neighbouring Serra do Cortume, and is for some distance covered by dense "capoeira," or second growth after the virgin forest—*mata virgem*—has been cut down. This is one of the most abominable kinds of stuff to go through, owing to the thick undergrowth of creepers, etc. I first cut a path from a neighbouring horse-track down to the desired point, where, along the summit, there is a long, broad "vallo," or ditch, which is a boundary of the property of Major João Ferreira, of the Fazenda do Cortume, to whom I shall refer later. I next set out lines both ways, and had picadas cut to the east and west. Then, leaving three men to construct a rough bridge over the vallo, and a stile on the further side to prevent cattle crossing, I went forward with two men—Joscelino and Antonio da Costa Campo, sons of my guide Fortunato—to drive lines ahead, coming across exposed rocks near the summit, and then passing numerous gullies twenty or thirty feet deep, with sometimes a nasty bit of marsh at the bottom.

In the evening Aleixo and his wife came to visit me, bringing a beautiful hot cake for "o Senhor Doutor" (myself). They told us of the neighbouring "bichiga" (small-pox); hence the hullabaloo I mentioned in a former letter.

August 24.—A nigger came in early, bringing four new-laid eggs as an offering to the Senhor Doutor. I went

hunting about in the mist for the site of a new camp till eleven. Then I removed the camp, with the aid of my men and four horses; and finally six men and two lads brought over bodily the thatched rancho, or shed, I had had constructed to protect the cook's fire when it rains; being all tied together with "llianas," it was quite flexible, and none the worse for its removal. The next day the camp was perfumed all day long by the burning of a wood called "camará," which smells like incense.

August 26.—Went off about 9.30, for São Amaro, where there was a special intercession at the church to keep off the small-pox. I passed crowds of people on the road. I called upon the padre, who is nice, but requires "drawing out." There is a large wooden cross in front of the church, with the implements of the Passion—nails, ladder, pincers, etc.—nailed on it. All the women and some of the men kiss it most reverently before entering the church. There are no seats, but a fixed barrier between the nave and the chancel. The women squat or kneel in the body of the church, the men and boys standing or kneeling in the chancel.

August 27.—I have been inconvenienced by not getting my luggage. When the ox-cart reached Paraopeba, on the 15th, I was very busy; so, after seeing that the instruments, etc., were laden up, I left my personal baggage to others. The result was that all went wrong—it never came! and I had to send back for it. Then, again, there was a muddle, and, though my instructions were very plain, the landlord did not know what to send; so this morning the "carreiro" (ox-cart driver) arrived early, asking for instructions, but stating at the same time that he would not go back, as the small-pox was very bad at Paraopeba. (Nice for me, who had worn one shirt for a fortnight!) Then there was

another commotion among my men, most of whom live at Paraopeba. I had to appease them, and said, What was the good of going sixteen miles one day to make special intercession against small-pox, and the next day getting into a "blue funk" about it, thinking their prayers were not heard? Then I had to bargain with three men, and, after a lot of haggling and nagging and beating down exorbitant prices, I arranged with one fellow to go and get my things. He afterwards turned "funky" and did not go. After all, I settled with another man, who finally brought up all I needed on September 1. So I was at last comfortable, after nearly three weeks of comparative roughing it, as far as bed and bedding were concerned.

August 28.—I found my poor little bridge destroyed, two flag-poles (ranging-rods) carried off, and three angle-pegs torn up, by the orders of the owner of the land.

August 29.—I have omitted to mention before, that when the chief returned from Pitanguy he brought with him a young man, one of the masters at the collegio there, to spend the vacation of two months in my camp, and to learn English. His name is Vicente de Azevedo Souza, aged nineteen. I like him very much, and he has chosen to stay with me, and not go about with the chief. To-day he shot, in the picada, a very pretty species of "Picapao," woodpecker (*Celeus flavescens*, Gmel.), which has a long yellow crest on his head. I bought for dinner a "jacu," which is larger than a fowl, brown meat, fat, and delicious. In the evening I shot some ortolans (*rola*), which are perfection; so our larder is well stocked, and the expenses are low. During the first ten days the cost of my living in camp was sixteen shillings, exclusive of liquor. Provisions are cheap, as a rule: rice is 200 reis (4*d.*) a litre, feijões 4*d.*, farinha 3*d.*, coffee 15*d.* a kilo., chickens 4*d.* or 5*d.*

each, cocks and hens 16*d.*, sugar 8*d.* a kilo., cachaça 4*d.* a pint, white (Portuguese) wine a milreis, and "laranginha" (orange gin) two milreis a bottle, pork 12*d.* a kilo., eggs a halfpenny each. Swedish safety matches are 7*d.* per packet.

August 30.—I caught a small scorpion about an inch and a half long. In the evening I made a pleasant discovery. I have rigged up a stand for my washing-basin, composed of four sticks stuck in the ground; it has four trays for holding soap, flannel, sponges, etc. I had also placed some guava marmalade on the lowest shelf, and for some days I have seen armies of the cabeçudo ant marching up the legs of the stand empty, and descending with lumps of the sweet stuff; but I could not find where they lived. To-night I went to my pillow (the saddle-bags) to take out two small cakes I placed there yesterday, and to my horror found at least two hundred ants consuming these delicacies, one of which was half eaten! "I went for them," and prevented their devouring any more by gobbling up the remainder, and then "taught them not to do it again," with carbolic acid. Tracing them out, I found they had dug a nest under my pillow, eaten two canvas straps of the saddle-bags, and had a store of sweet stuff besides. I disposed of the colony, and slept peacefully with my head over their hole. Now I remove my mat every day to examine.

Fortunately these ants are harmless, for they swarm, and two have just crossed this paper with outstretched mandibles to inspect what I was saying about their defunct relatives.

September 1.—The chief arrived last night, and to-day I have been showing him the work. He is satisfied, and specially praised the state of the camp and the men, saying

I had made them work, and, what was more, rendered them contented and pleased.

September 2.—I rode into Brumado with Vicente to give a little present from myself and the chief to João Baptista. It consisted of silver-mounted whip, spurs, and harness for a horse.

Camp near Serra.

September 13.—The natives are really a very excellent set of people. Perhaps the chief fault I can find with them is that they do not consider time at all, and do not understand what it is to be in a hurry, which is sometimes very trying. They are very religious, and never take leave of you without saying, "God be with you." When you ask how they are, they reply, "Quite well, thanks be to God," or, "by the Grace of God." When they speak of any future act, they say, "I will do it, if God permits," or "God willing." They ride two or three leagues to Mass every Sunday, or more generally walk it, and are always willing to do anything for you for the "love of God." They are simple-minded, honest, affectionate, and hospitable, and if they are too superstitious, it is from their education.

I told you of my ride into Brumado, on the second of this month. On the road I passed a dead ox, on which were eight urubus feeding; the odour from the carcase was agreeably counteracted further on by an orange garden full of blossom. Most of the oranges are now over, but there are some trees bearing both flowers and fruit.

At Brumado there was a great procession, with litanies and a special midday Mass, to keep off the small-pox. The sight was very picturesque. The crucifer led the way; then came some green bower-like contrivances surrounding the images of S. Sebastian (the protector against disease)

and of our Lord ; there was also a large banner, representing Christ with outstretched arms in the act of blessing ; then the image of the Virgin, followed by a number of tiny girls in white, with wreaths and veils ; then all the men from the neighbourhood in four rows, walking in Indian file. The priest closed the procession, dressed in a white and gold cope, under a canopy carried by six men ; and behind him came a huge mixed mass of women and children. They passed twice through the village, from the cross at one end to the cross at the other end, the church bells making the most terrific din the whole time.

For the last ten days it has been uninterruptedly fine, cloudless, and grilling from 10 a.m. to 4 p.m. (thermometer 100° to 120° Fahr. in the sunshine), though, with cool breezes, and very cold at night, the thermometer going down to 36° or 37°.

September 4.—Just before breakfast, an old nigger and negress appeared grinning at the door of my tent, and produced from a bag a fine "tatu" (armadillo), which they requested me to accept. I took it with pleasure ; but, of course, gave them some money, and also a nip of cachaça to the old man. It is an invariable custom, when you go to see any of the fazendeiros, for them to offer you a "matar bicho"—literally, "kill the worm," that is, a nip of spirits. And it is generally the second remark addressed to you on riding along, when you stop at a house, the first greeting being always "appeia," that is "alight."

We had the armadillo for dinner. The flesh is white and very delicate, but rich and preferable to pork. We also added some more ortolans to our larder, and "nhambu," a kind of grouse, with white flesh ; and "biscoitos de polvilho," "broas" (cakes made from "fuba," or ground maize), and "cara," or yams. I may here mention the

stereotyped style of cookery, so far as I have seen. The cook first takes some toucinho (salted fat pork) and puts it into a pot over the fire to melt ; then, after mixing a little water with the melted grease, he pours some of it into three or more other pots, in one of which is the chicken, armadillo, nhambu, rola—any of them, or all together ; in a second pot will be rice, in a third feijões, and so on. When the meal is cooked, the black pots are brought into my tent, and I partake of the greasy mess, washing it down with white wine, which is very sweet. If I can get bread so much the better ; if not, I have to be satisfied with farinha, which looks just like white sawdust, to try and take off a little of the superabundant grease.

September 7.—I found that a large “marimbombo’s” (wasp) nest, which was built on the ground in the middle of my picada, had, during the night, been eaten up by a tatu, or at least most of its inhabitants were destroyed, and the nest torn to atoms, of which I was very glad, as my men were much afraid of it, being very cowardly.

At 2 p.m. a man came to tell me that Dr. Rebouças had arrived, so I had to return to camp immediately, where I found Dr. Rebouças, Dr. Amerigo dos Santos, and some other visitors. After a long talk and examination of the rough plans, we all rode off together to inspect as much as could be seen from horseback, and I then accompanied the party a few miles on their way to Brumado.

September 8.—I had to go into Brumado to see the chief, and disturbed a vast company of fifty-six urubus, or vultures, and one “gavião” (hawk), who were gorging on the bullock I before mentioned. My benevolent chief,* to

* Mr. George Ransom. After leaving us he was employed on railway construction in the Argentine Republic, and was unfortunately killed while in the execution of his duty at Vipos Station, Tucuman, on the North Central Railway, November 11, 1885.

vary the monotony of camp cooking, regaled me on an omelette *aux points d'asperge, entre côte à la bordelaise*, and *mayonnaise* of chicken. He is a wonderful cook, and these delicacies were prepared under his supervision.

When I rode back, alone, the vultures had given place to fifteen hawks, some of which were inside the carcass.

We shifted camp to this place on the 11th, and again my preserved eatables proved most useful. I was told there was a wolf in the neighbourhood, and the fowls all took the precaution of roosting at the top of a big tree, under which is our rancho, used for cooking. At eleven o'clock I was awakened by the two dogs barking, and a few moments after there was a terrific yell from Vicente, whose tent is some dozen feet from mine: "*O lobo esta na minha barraca*" ("The wolf is in my tent"). I jumped up, seized my gun, and rushed out; but he was off. His wet foot-marks were plain on the side of the tent where he had tried to get in. Calling to some of the men to follow, I went off to see whether I could find any trace of him, but returned in about a quarter of an hour, having seen nothing. The men were all crouching round the dying embers of the fire, and told me it was very dangerous to go alone after the wolf. I said that was their fault for not accompanying me. Next night he came again at seven o'clock, and we went after him; but he disappeared, and we have not seen him since.* I suspect that he came after the fowls.

September 12.—This has been my worst day of carrapatos. On returning from the work I removed, or had taken off

* Captain R. F. Burton mentions it as the Guára wolf (*Canis Mexicanus*) of Cuvier. He says, "I have seen closely but a single specimen, which much resembled the French wolf, except that the coat was redder. This carnivore especially favours the lands where forest and prairie meet or mix. I have never heard of it attacking man; but, on the other hand, there are no snows to make it ravenous."—"Highlands of Brazil," vol. ii. p. 54.

me, 279, and during the night I got rid of thirty-five more. I had been too tired to sponge with diluted carbolic acid ; but, as a rule, by taking proper precautions I never have to pick off more than fifty from my body, though my flannel shirt is always red in patches, with masses of the wretches round the waist and under the arms.

September 13.—I went off after a toucan before breakfast, but could not get within shot. The position of this camp is far wilder than the other ; it is on a rapidly sloping grass-covered down or campo, which forms one side of a little *cul-de-sac* valley, extending to the Rio Camapuão. There is a stream which flows from a spring just below the camp, and across the stream a dense forest, whence proceed the chatter of monkeys, the screech of parrots, and harsh, discordant caw-caw of the toucan ; we also hear the soft note of *ciriema*, and many other birds. Parrot flesh is now added to our larder.

Vicente found three nests of different species of honey bees in the trunks of trees to-day ; the honey was delicious, and smelt like new-mown hay.

September 14.—At four o'clock this morning we had another exciting visitor ; this time it was an onça, or ounce, supposed to be more dangerous and braver than the lobo, or wolf. He, alas ! also got away before I could see him ; but one of the men told me he was the "onça sussuarána." There is another species found in the neighbourhood, the "onça pintada." *

* Captain Burton says, "Doubtless in the early days of colonization, when these large cats knew nothing of the gun, they were dangerous enough ; at present their courage seems to have cooled, and the Matador d'Onças—tueur d'onces—once so celebrated in Brazil, finds his occupation gone. Many travellers have seen nothing of this king of cats, except the places where it sharpens its claws. I have had experience of one live specimen, and that, too, by night. The people still fear them, especially at night, and have many

The temperature in this camp at night is 10° Fahr. warmer than at my last camp, and the minimum has not gone below 48° Fahr.; the locality is not much lower, but being on the north side of the divide it is sheltered from the cold south winds.

traditional tales of their misdeeds. They are still very dangerous to dogs, monkeys after which they climb, to the capybara an especial favourite, and to the young of black cattle."

CHAPTER VI.

SPRING-TIME AND BEGINNING OF THE RAINY SEASON.

September 29, 1883.—I have been told for some time that the rains would begin on September 15, and with marvellous punctuality during the grey dawn of that morning down came the first showers. The minimum that night was 56°. The day was a mixture of English spring and autumn. By 3.30 in the afternoon, the rain was so heavy that I was compelled to give up work.

What do you think becomes of all the stamps off your letters and newspapers? They go to a Mission in China, in which Vicente is interested. As you know, the people there leave their children very often to die in the streets. The priests buy the children from their parents, for one hundred old stamps of any kind, which the people value as curiosities. So in time you may furnish enough to buy a child.

The other day I had one potato brought me as a present, the first since I left Rio in July; so I prized it very much, cut it up and fried it myself.

Vicente killed a lizard, called "papavento" (*i.e.* wind-eater), which is supposed to be dangerous. I bottled it in spirits. We also found some more honey-nests. The bees, which are very small and yellow, are called "jatahy" (an

Indian name); they fill up the entrance to their nest with resin (which is very pure, and is used for violins) at the beginning of the winter, when they shut themselves up and eat the honey. The resin is to prevent woodpeckers and other birds getting into the nest.

I am now cutting my way through mata virgem, or virgin forest, a mere trifle compared with those on the coast and nearer the equator, but still beautiful. Our chief, however, is never tired of speaking of the really grand and immense forests of Spanish Honduras, which, he says, is the most splendid place in the world. But I will briefly describe my woods. Last night (September 26) we arrived at the banks of the Rio Camapuão, and we shall go along this valley until we nearly reach Brumado. The stream which we have been following from the divide, during its passage through an increasingly narrowing gorge with steep forest-covered sides, at length reaches a fine cascade, the water falling some sixty feet over the bare rocks into a clear, deep pool at their base. The stream then enters the valley of the Camapuão, and shortly empties itself into that river; the valley at that part is broad, flat, and marshy, with a few scattered patches of capoeira and shrubs. I crossed the Camapuão at a point where its broad valley narrows into a gorge. The river there is some fifty feet wide, and shallow, with an even and gentle fall. On one side is a steep bank some thirty feet high, covered with forest, beyond which is campo, or grass down; and on the other side, a broad belt of bamboo jungle, covered with water in the flood season. Beyond this jungle rises a hill some five or six hundred feet high, hidden in virgin forest, from which are heard the distant chatter of monkeys, the melancholy caw-caw of toucans, and the singing of a thousand birds. The river-bank is fringed with trees, some of which

are a mass of white, yellow, violet, or dark-blue flowers, beautiful leguminosæ (*Inga* and *Mimosa*), with pink cistus-like blossoms—trees with fresh young leaves and flower-buds just bursting in the early spring, sweet daphne and wild orange, good timber for ornamental purposes (as I found by cutting it down), the “sucupira” rather resembling rose-wood, “camará,” a pinkish white wood, and “salgueira,” a deep red colour.* There are also tall slim trees, with leaves some eighteen inches long by six wide, of a deep chocolate colour on the under side, and two extra ribs along the edge of the leaf (*Melastomaceæ*); bignonias in flower, orchids, and other parasites; tree-ferns besides many other ferns, and creepers innumerable. One creeper was very pretty, having pale green leaves and countless clusters of exquisite light pink flowers, in size and shape similar to an azalea (*Jacaranda tomentosa*). Some of the lianas are fine stemmed, like a thread of green cotton; others like hanging masses of twisted rope, tough, yet pliant. You have the ceaseless hum of a hundred bloodthirsty diptera and of cicadas, with notes from the shrillest pitch to the deepest bass. A few sober-coloured brown, grey, or white butterflies (*Euptychia*, *Taygetis*, *Leucidia*, *Eurema*, etc.) and small moths skip and flit between the trees and undergrowth, while occasionally a brilliant *Morpho* floats lazily

* I copy from a (MS.) “Catalogue of the Woods of Brazil, arranged alphabetically after their vernacular names,” etc., John Miers, F.R.S., which is in the Botanical Library at the British Museum, South Kensington.

“*Sucupira*.

Sicuper assú (grand S.) 22 m. hauteur, 8 centim. diam.

violet grisâtre faible à travailler.

Sicupera mirim (petit S.) 22 m. hauteur, 10 centim. diam.

plus dur que le precedent.”

(From list of woods sent to France by the Comte Gesta.)

Camará, *Acrodictidium Gardneri*.

Salgueiro, from Rio São Francisco, a strong hard wood, useful in the construction of large boats (Burton, vol. ii. p. 381).

along, and a strong-winged *Papilio* or gay *Callidryas* rushes past with rapid flight. Then under one's feet is a carpet of dry leaves, among which creep countless ants—red, yellow and black; all sizes, from the smallest, almost invisible, to savage-looking hairy, golden, or red and black creatures, half an inch long. Such is a faint picture of my surroundings to-day.

A few days ago Vicente shot a large lizard or "lagarto;" it was three feet eight inches long, and was killed while lying asleep basking in the sun beside a small pond near our camp. We skinned and cooked it according to a recipe contained in a book I bought when at Rio de Janeiro, called "Cozinheiro Nacional," or National Cookery, and which gives directions how to prepare and cook the onça, paca, monkey, capivara, snakes, frogs, armadillos, toucans, and countless other birds, snails, ants, and, in fact, everything imaginable. The result of the experiment with the lizard was most satisfactory, the flesh being a delicate white, and most delicious, rather similar to pork in flavour, with a dash of the richness of a mackerel without the fishy taste. We have also been eating tatus (armadillos), and a paca which we caught lately. When I was returning the other evening, wading down the river, a paca came off from one bank and dived into the water to swim across. One of my men hit it with his fauce (billhook), slicing half its head off. We prepared him first by scalding and scraping the hair off, when he looked just like a sucking pig; the next day we had him roasted on a spit. The crackling and the fine white flesh were excellent.

I am always getting little offerings from the natives. To-day I received a bottle of laranginha, a bottle of milk, some tobacco, and some oranges; all from different people.

I can now no longer sleep on the ground, owing to the rain and the insects, so sent into Brumado to try and get a hammock. Senhor João Baptista sent me a very nice one, as a present. It is made of the fibre of a kind of palm called burity, and is very strong.

October 3.—To-day I worked through a swamp—grand for a naturalist, obnoxious to an engineer—with dense masses of ferns now unfurling their new fronds of all colours, from light red to brownish or green, a luxuriance of tree-ferns with leaves six to eight feet long, and shrubs bearing the most fragrant white flowers, while *Morphos* (*M. Achil-lana*) and *Heliconius* were abundant.

Having read in my cookery book a recipe for fried "tanajuras," a kind of ant, I was most anxious to come across this insect and try the dish. On September 30, there was a great swarm of them flying about our camp. They are very formidable-looking creatures, not unlike a hornet, only entirely brown, three inches across the wing, and over an inch long. Having taken sufficient for my collection, I then set to work to capture them for food, in my butterfly net. In a few minutes I had over a hundred, and then followed the recipe in the book, which says, "Take a number of tanajuras and scald them in boiling water, then pull off the abdomens, which are to be fried in fat, sprinkling them with salt and pepper. When they are well cooked, serve them as a surprise dish. In taste they resemble prawns." The females only are used, as they are full of eggs. I confess I tried my first tanajura with much delicacy, but, finding it excellent, ate half a dozen, and finally finished the whole lot.

I must next tell you something more interesting about them, as, being Sunday, I had leisure to watch. I noticed nothing remarkable about the males, but observed the

females carefully. They fly about rapidly, and finally settle on the ground ; then, in less time than it takes me to write it, they lift up the centre leg and break off their wings, first on one side, then on the other ; after this they crawl about, seeking a spot to burrow in—they sometimes wander backwards and forwards for a quarter of an hour before deciding. When settled, they cut away the grass all round, carefully removing it, and then begin to dig out the earth with their jaws. When an ant had thus settled, supporting itself sometimes on two hind legs, sometimes on four, and excavating with its mandibles, the fore legs kneaded the earth into pellets, or else scraped out the powdery dust. When it had formed a pellet, it always backed out of its burrow with the lump of earth in its jaws, and then, turning round, deposited it about two inches from the burrow on the down side of the hill, so that the rain could not wash it back again. The insects dug some four or five inches deep in every case. This is the extent of my observations, but I am told that if you dig in January, you will find her in the burrow surrounded by her young progeny.

The same evening I had another display of interest, this time inanimate nature. We had a superb sunset ; the sun sank just before six, and then, from a wondrous golden horizon, rays of bright crimson darted forth into the pale blue sky overhead, lighting up the sides of our forest-clad clough, which runs E.N.E. into the broad fertile valley of the Rio Camapuão, with a warm glow, the profile of the high ground on the other side of the valley fading into the outlines of the successive ranges of gently undulating hills of a deep purple, the furthest group standing in bold relief against the golden sky. Turning round, we saw the forest, the red soil, the tufted grass, and bushes all lit up

with the wondrous crimson glow, and the illuminated branches of some dead trees gave a wonderful effect of distance to the intense deep blue heaven beyond.

By 6.20 it was quite dark, and all the light faded away. Then came the lovely after-glow, everything again standing out in relief, with a beautiful rosy tint reflected from the west, and in a few minutes that also faded, the shades of night fell, the Southern Cross, Milky Way, Austral Crown, Scorpion, Magellanic Clouds, and all the other brilliant—and, alas! to me unknown—constellations of the southern hemisphere shone out brightly in the moonless sky, the fitful light of countless fireflies danced over the bushes in the valley, and the silence was broken only by the cheerful chirruping of the grasshoppers and field-cricket, which lasts all night long. Soon a pale glimmer appeared in the south-east, and before long the brilliant queen of the night rose from behind the forest, quenching the paler fires of the stars, and flooding the valley with her astounding brightness, while a soft beam of silvery light stole into our tent.

Insects are becoming more plentiful already, and trees which looked dead sticks are breaking out into wondrous large reddish-green leaves. Even here, where in winter there appears so much foliage, nature seems to be putting on her spring attire after the few days' rain we have had, and the grass, hitherto dried up and withered, is sprouting.*

The thunderstorms here and elsewhere have cooled the air, and the temperature is at least 30° cooler in the sunshine, while the cloudy yet lovely weather makes the

* Many of the trees on the campos are deciduous; it is only in the valley, near the streams and rivers, at this altitude, that the leaves do not fall in winter.

work pleasanter than was possible with the thermometer at 138° F.

Vicente left here to-day to return to Pitanguy. I shall miss him very much. For six weeks he was my only companion besides the men, and he has been so kind and helpful in a thousand ways. Just as he was mounting his horse, he was stung in the left ear by a large wasp, which went so far in that we could not even feel it for some time. It was finally killed by pouring in a little *cachaça*, and then we took it out. The pain must have been very great.

Early on the morning of the 8th, I was awakened by our first great thunderstorm. In a few minutes the ditch round the tent was full, and streams poured over the floor. I had to get up and remove everything I could out of the wet.

Our number was increased on Michaelmas Day by the arrival of Mr. Roberts, and since then we have somewhat changed our mode of life. Instead of having breakfast before going out, our general routine is as follows: up at sunrise, and have three or four raw eggs beaten up with a little *cachaça* and water, some bread and coffee; then go out on the work till about midday, when our breakfast is brought out to us, consisting of stewed or roast fowl, with rice, *feijões*, and bread; then work again after about an hour's rest, returning to camp in time to change clothes, wash, and hunt for *carrapatos* before dinner, which we have just after sunset.

My routine on retiring for the night is to lay a grass mat in the hammock, then a sheet of waterproof, and a blanket which has been aired or dried during the day; then, after a final hunt for *carrapatos*, and sponging with diluted carbolic acid, sprinkle some of it on all the blankets

necessary, examine revolver and gun, have a "night-cap," and then "douse the glim."

We have lately been breakfasting in the most picturesque spots beside the stream—some six or eight feet wide—which flows between moss-covered banks, dotted over with ferns (especially maidenhair), while every few yards rise huge tree-ferns ten to fifteen feet high, besides numerous other small trees or shrubs. Everything combines to make a pleasant *tout ensemble*—the delightful shade when the sun is 130° in the open, the delicious murmuring of the brook, and the verdure; not to speak of breakfast, the first meal in the day, when one is really hungry after hard work. This luxuriant tropical vegetation is very delightful, and, as yet, is unaccompanied by the enervating damp and heat of the lower regions along the coast.

One evening, as we were passing the Fazenda de Cortume, one of the sons asked us to alight and have coffee. The old lady, Dona Gertrude, wife of the major, received us; she was surrounded by a host of sons and daughters, their wives and husbands, her grandchildren, and two great-grandchildren, the latter running about in a state of nature. The room we were in—the entrance hall and dining-room—has three doors; one of them was crowded by the female slaves and their children, many of whom were unclad. It is quite a patriarchal establishment, and I should very much like to know how many people live there—probably at least fifty. We both liked the old lady very much; she is portly, and has a great presence, but is very sad, owing to the illness of her husband, who has been in a bad state of health for over three years.

We have had five days (October 12 to 16) of cold drizzling rain, but no deluge; it has been so cold we have

put on great-coats and huddled on all the clothes by day, and coverings by night, that we possess.

To-day (October 18) we had breakfast near the waterfall, in a spot which I can best liken to the fairy glen at Bettws-y-coed, with the addition of swinging masses of creepers, maidenhair, tree-ferns, and bamboos. One must see bamboos to understand their extreme gracefulness.

I am greatly tantalized at having no time to botanize. There are now hundreds of spring flowers coming out on the hillsides, scarlet, sky blue, yellow, white, purple, bushes with deliciously scented white flowers, and dozens of wonderful leaves. The few specimens I have tried to dry have been mostly spoiled by the damp. I should very much like to come out here with a party of naturalists, each to take up different branches and devote all their time to collecting. It would be most interesting.

Alas! my minimum readings of the thermometer can no longer be given, as my dog broke it last night.

I enclose you a copy of a Pitanguy newspaper. It is called *O Pitanguy*, *Orgam critico*, is six inches by four and a half, and consists of four pages.

The day after we were at the Fazenda do Cortume, Capitão Sydney, of the next fazenda, Boa Vista, came to the camp. He is son-in-law to the major, one of whose sons accompanied him; also his own son, a very intelligent-looking boy of ten. Later I was favoured by a visit from two niggers belonging to the major; they laughed a great deal, did not speak much, but smoked cigarettes of my Latakia wrapped up in newspaper, which they found rather strong.

October 22.—After spending two days at Brumado, we are once more in the solitude of our mountain-camp. The three hundred feet difference in level between this place

and Brumado makes a great change of temperature ; there it was very hot, with very little air, so that the return to this fresh, light atmosphere was very pleasant.

October 23.—Last night we had another deluge. We were awakened by the noise of the downpour on the roof of the tent. Lighting a candle, I examined whether the water was coming in ; there was just a trickling on the up-hill side. I turned in again, but not to sleep ; the drum-like roar of the rain on the tent was too great, added to the rushing of the rivers flowing down the deep gutter which surrounds the tent. Soon I felt a curious motion under my hammock, a sort of upheaval ; it was the dog creeping about, as he always sleeps near my feet. I concluded the rain was coming in, and, putting down my hand, felt a stream. On striking a light, we saw a curious sight. Between Roberts's camp-bed and my hammock rushed a river some two inches deep, and in it were floating empty cups and pots and slippers, etc., bobbing up and down at the lower side of the tent ; my gun-case and saddle-bags had diverted a portion of the stream under my hammock, while the rush of the rivers outside had prevented my hearing the stream inside. We rescued our slippers and grabbed at other floating articles, and I then, from the vantage point of my hammock, viewed with some amusement the novel sight of a stream, more than a yard wide, between our two beds. The rain came down in such torrents that the ditch, though it was pretty deep, was not large enough to carry it off ; so we had it enlarged next morning, and now it is quite a jump to cross it.

The rainy season having begun, the traffic has likewise commenced. While the dry season lasts, the atrocious tracks, called roads, are at least bearable ; but there is no pasture for the cattle that draw the carts or for the pack-

mules ; therefore, with the sprouting of the new grass, business is resumed. October 16 was the first day I noticed the increased activity. On reaching the high-road on the way to work, we passed two carts, each drawn by twenty oxen ; and then about a hundred mules, all going down, under the escort of some niggers, to Carandahy, to be laden with salt and other merchandise. Now, every day from our work on the hills, whence we overlook a mile or so of the road, we see a continuous line of three, four, or more ox-carts wending their way at a snail's pace to the accompaniment of that heart-rending humming screech, increased by the yells of the cruel drivers, whom I have before mentioned. There are also teams of a dozen or more pack-mules, the leading mule having generally a brave headgear of silver or bright metal, hung with many bells, gaily coloured tassels, and generally a little dressed-up doll between its ears, supposed to represent the Blessed Virgin Mary. The bells jingle pleasantly, and these various sounds are increased by the cheerful songs of the nigger drivers, *carreiros* and *tropeiros*, interspersed with invectives and directions to the animals to "gee up," keep to the road, take the lower or higher track, go to the left or right, etc. The niggers' songs are a sort of wild, weird, tuneless howl, or series of yells ; but as they say the oxen would not go without the *music* of the wheels, I suppose they think the mules would make no progress without their soul-stirring melodies.

October 27.—Major João Ferreira do Cortume, whose illness of over three years I have before referred to, died to-day, and I have been invited to attend the funeral to-morrow, of which I will write you an account in my next.

October 28.—The major owned the country round for a great distance, including the ground I am encamped on.

His family dislike the idea of our railway going through their property, and, in fact, as I told you, tore up a foot-bridge and some of our pegs; but they are now quite friendly to us, personally, as I have also mentioned. I therefore sent down a man with my card to the widow, "with much sympathy and condolence." The result was a letter from one of the sons-in-law, which I translate:—

"Ilmo. Sr. Dr. Hastings Charles Dent.

"MY FRIEND AND SIR (= MY DEAR SIR),

"My father died at two o'clock this morning. If you would do us the charitable favour of assisting at the funeral to-morrow, at midday, at the Olhos d'Agua, we should be grateful.

"Your obliged friend,

"ANTONIO TORQUATO DE FONSECA."

The letter was written with violet ink and sealed with a violet wafer. The writer saw my messenger, and said he hoped I would be able to go to the house about 6 a.m. As a compliment I felt bound to do this, for it is good to humour the people, especially when they are unfavourable to the work.

This morning accordingly, attended by a camarade, I went to the fazenda, arriving at 6.30, and was received by some of the sons and sons-in-law. After exchanging a few words, I was taken into an inner room to have coffee and cakes. A few minutes later the widow came in, attended by two daughters, and I had to condole with them. They really all appeared very sorrowful, and the old lady looked miserable, though hardly more so than the last time I saw her, when she knew her husband was dying. We had a little talk, and she told me that one of

her sons—another Antonio—was ill in bed. I had to go and see him for a short time, and then returned and sat with the good old lady, a sister-in-law, daughters and granddaughters, in silence, while she groaned. At length I made an excuse of looking after the horses, and went out. At eight we had a plentiful Brazilian breakfast; the table was spread three times, and about twenty sat down each time, all men. At nine there was a little excitement, and every one said, "It's coming." I wondered what. It turned out to be the coffin, slung on a long pole, carried by two men. The lid was hinged so as to open like a triptych; the outside was covered with black cloth, trimmed with gilt braid, and the inside white, with the same braid trimming. It was then taken to the inner rooms, and there was more waiting. English funerals are bad enough, as far as delays go, so I suppose it was only to be expected the Brazilians would be still more dilatory.

About ten, the padre from São Amaro, who was the major's confessor, arrived. He shook hands with the sons, with me, and with others, and then, instead of going in to comfort the mourners, began to cut up tobacco and make a cigarette. The bier was next prepared, consisting of two long poles, with five cross pieces lashed together with ropes.

At last, about 10.45, we started. The two daughters and some grandchildren accompanied the coffin to the hall, quite quiet, but weeping much. The coffin was placed on and lashed to the bier, and covered with a yellow and red damask pall, over which was thrown a red and white tablecloth; then four niggers, taking the ends of the poles on their shoulders, trudged off. There were about five and twenty slaves and servants belonging to the estate who went on foot, and took it in turns to bear the

bier, and also some thirty horsemen. All uncovered their heads on leaving the house, and a weird kind of chant was sung by the men for some two or three hundred yards.

We rode about eight miles to the chapel at Olhos d'Agua, the procession increasing in numbers as we went along, until at length we were some forty footmen and seventy horse, while other friends from Brumado met us near the cemetery. Two incidents occurred on the march : one, the slaughter of a snake (*jararacussú*) ; the other, a mule rolling over twice with his rider, who did not appear any the worse.

When we reached the Rio Camapuão, we found it tremendously swollen from the very heavy rains of last night. The ruined bridge had been repaired on purpose, by having a few new sticks and sods laid down ; but, of course, we led the horses over, as it was not very safe. Finally we reached the cemetery at 1.30. I had been very kindly received all along the route, and was greeted with dozens of handshakings and compliments when I arrived. I stayed outside the churchyard, as did all except the family, who went into a house by the church. The coffin was put into an alcove, the two ribbons which alone held the cover were untied, the lid opened, and the corpse exposed to view. The departed major was dressed in a long black garment down to the ankles, white stockings, black shoes, and a white cloak ; his head lay on a pillow covered with native lace work. At the head of the coffin were placed a crucifix and two lighted candles. During this lying in state, the family (men only went) received their friends in the house. Shortly a band of fifteen men, who had been for some time tuning up, came and discoursed melancholy music, much out of tune, but in tolerable time.

At length, the three priests who were to take part in

the ceremony went into the church to robe. They were the priests of São Amaro (Padre Antonio), Olhos d'Agua (Padre Francisco), and Lagoa Dourada (the latter place is a league and a half off). Their vestments were cassock and surplice; he of Lagoa Dourada, who read the service, had also a black stole. The service began in the *chappelle ardente*, the family meanwhile unpacking and distributing a large box of candles, some three feet long. The said box I had seen arrive with the coffin, and leave the fazenda on a nigger's head half an hour before we did. I had endless trouble to keep my candle alight, as the wind blew it out every moment. The preliminary part of the service being over, the sons carried the coffin, which was then closed, into the church, where it was placed in the centre of the nave, and again opened, the feet being towards the altar. I was in the midst of the family by the head of the corpse, and after a time the odour became sickening, while flies settled on the already discoloured face. The service seemed to me interminable, with seven Paternosters at long intervals, at each of which the priest sprinkled the body with holy water. In the middle of the service, the priests seemed affected by the smell, when one of them, pulling out his snuff-box, took a big pinch, and handed it to the two others, who did the same! The coffin was then again closed, only to be reopened when placed beside the grave, which was in front of the altar, the excavated red earth being piled up on the flags on each side. After a few more prayers, the poor sons had to shut the lid for the last time (without tying the ribbons) and lower it into its final resting-place, when the top once more gaped open, and every one in passing out threw earth literally on the dead man's face! The sons immediately regaled themselves with a cigarette—hardly to be wondered at; and I

mounted my horse and rode off. The whole affair seemed to me rather repulsive, and the repetitions in the service at least needless, while the heartless conduct of the priests, bowing and smiling to each other over their pinch of snuff, was scandalous.

The major was a great man in these parts, as you may imagine from the number of people who attended his funeral. The fazenda was full of visitors, who had come off at such a short notice—twelve hours at most ; for they slept there on Saturday night, and kept coming out of their bedrooms after I arrived. Four of these bedrooms open into the hall where I was received, and where we breakfasted. There were some fine-looking old gentlemen, who rather stood aloof from me at first, as a stranger ; but when the sons explained I was the “doctor” and chief engineer for the district, they gradually spoke to me. One asked whether one could go by land from here to England. Another said he believed it was six months’ journey to England. When, after answering them, I said that on the opening of the railway they would be able to reach Rio de Janeiro in a day, they thought that I was romancing. Such is the native mind ; but, perhaps, not inferior to that of many English people who have never been to London.

November 3.—To-day, by special request, I attended the Requiem Mass of the seventh day at the private chapel in the Fazenda do Cortume. The service was timed for ten. I arrived a few minutes before, and was, as usual, received with great kindness. The priest of São Amaro arrived about 10.30, and Padre Francisco a quarter of an hour later. Service began at eleven. All the men of the family were attired in more or less decent black, with new unstarched black cotton shirts and stand-up collars, so with their swarthy complexions and straight black hair they

looked very funereal. There was also a crowd of neighbours and friends and slaves of the male sex, mostly in their usual attire, while just before the service began the female portion of the congregation came in from an inner room.

The chapel is a small niche off the hall, only large enough to hold half a dozen people, so the doors were thrown open and the congregation filled the hall. The widow, daughters, and daughters-in-law did not appear; but there were a good many granddaughters, some of them really pretty little girls, all shoeless, but in neat black cotton gowns. A great many other young girls and women were present, of all shades of complexion, dressed in the brightest and gayest colours, and with flowers in their shining, well-oiled, neatly braided black hair. Little niggers with only a shirt on, and numerous dogs, rambled about among the kneeling crowd during the whole service, which was very quietly performed, the major's confessor being celebrant, and Padre Francisco deacon. The chalice pall was violet, but the chasuble was rather incongruous—I suppose it was the only one at the fazenda—being of a stiff white silk, braided with crimson flowers.

It was a picturesque and touching sight. The small dim chapel, with its painfully crude and barbaric carvings, pictures, and gilt and tinsel ornaments, lighted up by six tall tallow candles on the altar; the priest in his white and red chasuble; the dark, dirty, and dilapidated hall, its mud floor covered with worshippers; the women surrounding the chapel, a few sable garments being lighted up by the other patches of bright colour; the mass of men filling the rest of the room, mostly rough, unkempt, unwashed, in many styles of dress, some in huge riding-boots, others with spurs on their bare feet, variety of colour and origin, some rich,

some poor, some bond, some free ; but all kneeling devoutly—all, at least outwardly, reverent, attentive, and intent upon that service, which, they trusted, was to be a source of refreshment and assistance to their departed friend or master.

November 4.—We went in for the day to Brumado to see one of the partners of the firm,* who arrived with Roberts on September 29. He also brought up with him my old friend Bithell, who, you remember, went with me on my ride up country. They have just returned from riding all over the projected route and visiting the different members of the staff. When they came to my camp and dropped Roberts here, I was at work some three miles off ; and though I returned as quickly as I could, after the messenger came to call me, I was unable to get back in time to see them, as they wished to reach Brumado before nightfall.

November 7.—I must not indulge too much in descriptions of camp-life, or you will be bored ; but having some time since referred to our cooking, I must now say that, as a rule, our sole food is chickens, which are cooked in two ways only—"refogado," or stew, and "asado," or roast. Having told you the way of preparing the refogado, I will now mention the asado, which I happened to see one day, when, it being very wet, I was plotting some work in the tent. Our swarthy cook ran a long stick through the trussed chicken to act as a spit, and then, squatting on his heels, turned it round and round in the ruddy flame. When the bird was getting dry, he twirled round as on a pivot, dipped his hands into a calabash of pork fat, and, taking out some of the pomade-like stuff, plastered it with his fingers over the browning chicken !

* Mr. Leathom Earle Ross.

There are now occasional flights of myriads of winged white ants (*Termites*), and large scarabæus-like beetles (*Copris*). Our tent affords a fine dry shelter for all kinds to burrow. I wish you could see us at dinner—to-night, for instance—by the light of two candles, one stuck in a beer-bottle, the other in a match-box ; Roberts seated in his folding-chair, I on my hammock ; on our laps, on napkins, my enamelled plates with the usual food ; at our feet, various black pots and pans taken off the fire and containing fowl, onions, beans, rice, cabbage, etc. ; near the entrance our swarthy cook, sitting on his heels and awaiting our orders ; beside him, with hungry eyes, our two dogs, one of whom has the most intellectual and thoughtful face I ever saw. (Both poor brutes are suffering from the attacks of insects—*bernos*—which raise lumps all over their bodies.) The scene is completed by a cold drizzle outside, while whirring round our heads continually are huge beetles, with a hum like a threshing machine, and every moment they dash into our faces, or the candles, or against the roof, and then fall into one of the saucepans !

It still keeps cold, with much rain ; no deluge, but chilling drizzle. Thermometer averages about 60° after sunset, and from 70° to 120° in the daytime.

November 13.—It is now beginning to get very warm, and the sun at midday appears almost at the zenith, and casts no shadows ; but we are only two degrees or so north of Rio, which is almost on the Tropic of Capricorn, where the sun will not arrive till the 21st of December, so we may now expect three months of really hot weather. The new vegetation is coming up fast, and I hardly recognize some of my old picadas, after not having passed through them for six weeks or so. Birds'-nests and young birds are much more abundant lately, and tadpoles are getting

quite large. Carrapatos are diminishing, but other insects take their place. The cabeçudo ant, also called "carregadeiro" (umbrella ant), is very troublesome. I always wear a nightcap, and sometimes wrap my whole head up in a handkerchief as well, to keep off insects. These ants are fond of biting off one's hair quite short, and sometimes—of course by mistake—take a nip out of your skin. They cannot reach me now in my hammock; but as the poor things want to make their nests comfortable, they have taken a great partiality to my nice new flannel shirts. The sleeve of one of these was left one night just touching the ground, and next morning it was half gone. By fragments dropped along a beaten track, I discovered the nest lately built under the awning of the tent.

Another night I kicked off a second shirt on to the ground in my sleep, and when I woke it was honeycombed in a dozen places. Once again the tail end, touching the ground, was cut away in one night, so that it is now six inches shorter than the front. My washing flannel has also shared the same fate. I must confess, however, that though they are fond of cutting up flannel shirts as if they were green leaves, which is about all they ever had the opportunity of exercising their jaws on before I arrived, and though I have often had them on me, they do not sting or hurt, but if frightened they may nip you and draw blood with their strong jaws.

Within the last two days another creature has put in a tolerably plentiful appearance—the earwig. They are everywhere; they fall out of your towels when you wash, and, with ants, beetles, and carrapatos, share the shelter of your garments when you hang them up. Fleas also swarm just now. Where they suddenly sprang from I don't know;

but it is *so* pleasant to awake and feel them running races all over one's body, and to be too sleepy to rouse one's self for a hunt.

Paroquets absolutely abound about here, and toucans are numerous, as also orioles. I wish I could bring some of them home.*

To-night the weather is perfect; one can see to read by the clear light of the full moon, the sky is cloudless, and the outlines of the mountains—tier above tier—are softened by her mild rays, while the stillness is only broken by the ceaseless chirrup of the crickets and the harsh croak of the bull-frogs. These balmy nights make up for the fatigues of the day, but the temptation is very strong just to sit or lie idle and enjoy them.

It may interest you to hear the high-sounding names of my workmen. The three sons of my first guide, Fortunato da Costa Campo, are Jocelino, Antonio, and Lino Camille Lellis. There are besides, Francisco José Ramaes, and his son Francisco da Cunha Ramaes, Aleixo Tavares de Carvalho (the cook), José Antonio Ferreira, Candido José Querino, and Antonio José Brumo de Carvalho. As it is always the rule to call every one by their Christian names here, I generally take the first, except when two bear the same prænomén.

* On leaving Rio de Janeiro (July, 1884), I bought two green paroquets, two crimson tanagers, *Tanagra brasilia*, and two green tanagers, *Calliste*, or *Tanagra tricolor* (Tanagrinæ, Fringillidæ). One paroquet died before reaching Pernambuco, where I bought two more; but they all died before we touched at St. Vincent. One of the red birds pecked his brother to death, and the other died before he had been three weeks in England. The green tanagers—which I was told were the most delicate of all the birds I had—survived, and though one died after about a month's stay in England, the other survived till November 1, 1884, when he expired after a long and painful illness; his feet were covered with white blisters, and he appeared to suffer much from these.

Camp near Casa Grande.

November 18, 1883.—We have again come into this neighbourhood for a few days. As it is important to complete the outdoor work of this section, if possible, before Christmas, the staff on the next division are to finish the survey from where I leave off to the existing railway. They arrived at our last camp on the evening of the 14th inst., and slept there, having to make the best of our scanty accommodation. Next morning, early, I started off with them to point out my proposed route, and after being all day in the saddle, I left them when the ox-cart bearing their *impedimenta* appeared, and they were selecting a camping-ground. I had a long, solitary ride back, and prepared for moving here the following day. It was intensely hot on both these days of travelling; in fact, since the 10th there has been no rain, but sultriness and thundery clouds, with intervals of scorching sun. We managed to secure a room in Alcixo's hut, and having removed the stores of feijões and milho and toucinho, etc., which it contained, use it for eating and living in, while Roberts sleeps there. I thus have my tent to myself once more, as I wished to be with the men. I was summoned that night by the chief of the other party, as there was some hitch about the route; so went over there on the morrow, and after another agreeable day in the saddle, we settled everything very satisfactorily, and I returned here by sunset.

The members of this other division, in addition to being fearfully tormented by the carrapatos, have suffered from "bernos," to which carrapatos are a trifle. I refer to these elsewhere.

I would give anything to be able to sketch. I could

send dozens of glimpses of our life, native life, the scenery along our route, etc., which would be most interesting, and I dare say the *Graphic* would publish them. They might, perhaps, help to bring the railway before the subscribing public in England, and might be useful. But, alas! I cannot.

November 22.—I find the weather rather trying.

The house that we live in would amuse you to look into occasionally. It has five or six rooms, but only one window (at the back); the result is utter darkness when the doors are shut. Mine host (Aleixo) has four children by his present wife (the last, Maria, born when I was here last), and two by his first wife. They are always in and out, the children rushing in half a dozen times a day, taking off their hats and stretching out their hands for a blessing (saying "Sua bênção," or "Seuchrisma"). This is a form of respect repeated by Aleixo whenever the "sogro," his father-in-law, comes. The latter is a little old man, with a remarkably fine head and sharp eyes. He has five daughters and three sons. People mostly go in for large families hereabouts.

Aleixo is tolerably well-to-do, as things go here—and, in fact, I have not come across any abject poverty—but you may remember, as our cook, he is not remarkable for cleanliness; however, I know no one in these parts who is. I am in total ignorance of the Brazilian proverbs, but certainly "Cleanliness is next to godliness" cannot be one of them.

The only way of reputing wealth among the natives is after the Abrahamic standard—slaves, cattle, oxen, horses, mules, and pigs, with pasture to feed them on. Aleixo has several horses, cows, and oxen, plenty of pigs and dogs. No one ever mentions money in talking over a man's possessions.

Aleixo, his wife, and children wait upon us at our meals, and squat on the floor watching every morsel we put into our mouths, while our door is surrounded by a motley crowd of chickens and pigs, dogs and cats. On the grass-covered hill beyond are the cattle and horses feeding, and a slave or two stands outside the door, while nigger youngsters play around. Occasionally my dog rushes after some presuming pig, who comes in grunting to pick up morsels, which doggie thinks are his perquisites.

I am thankful that I sleep away in the tent, as the children are not very quiet during the night season, and dogs and pigs constantly give notice of their proximity by barking and howling, grunting and squeaking.

On Sunday we had a constant throng of visitors in our room, and one lady performed the generous operation of cutting Roberts's hair, for which she did not refuse a milreis ! The last time my hair was cut was at Brumado, by a butcher, and very well he cut it too, "ao escovinho" (lit. a little brush), i.e. *à la Française*, so short you could not pick up a hair with your nails.

There was a crowd at our midday breakfast, the squatting natives surrounding our table (a drawing-board) admiring and fingering my damask breakfast-cloth. It was the same at dinner, and presented a queer "Study of an Interior : " the natives squatting on the mud floor, in a room with walls composed of bamboo framing filled with mud ; the walls reaching to the level of the springing of the roof (architecturally yclept wall-plate) ; above, the roof—of tiles placed on the rafters (long sticks), the cross rafters or purlins tied on by lianas, the tiles blackened with the smoke from the chimneyless kitchen ; in the next room, the voices of a dozen female voluble tongues talking about the English " doctors," and plainly heard over the partition ;

outside, the usual throng—and noises inseparable therefrom—of children, dogs, and pigs. Our table-cloth was scattered over with the ochre-coloured beetles, which give out phosphorescent light from a spot on each side of the thorax,* while countless shining emerald spots on the blackened tiles above, piercing the darkness of the dimly lighted room, told of unnumbered quantities of those same beetles which had there found a temporary resting-place.

November 24.—The sogro—father of Aleixo's wife—arrived at dark with his wife and four daughters to serenade us with a guitar. Aleixo went out to meet them, and, kissing the old people's hands, asked their blessing. The old fellow is a little shrimp of a man, with a very dirty exterior, and his chin is always like a stubble field; the upper lip also is chronically brown with extraneous particles of snuff, which he is continually shovelling up his nostrils. But he is a strong Conservative, which covers a multitude of sins. He is now seventy-six years old.

I should like you to have seen our "party." We assembled in the parlour—the next room to ours—likewise with mud floors and walls, and opening into our host's bedroom, which has no window and no external door. The only furniture in the parlour is a wooden-framed bedstead and a bench. The former has an ox-hide nailed on it, on which the mattress is placed, which is the usual thing—a cotton case filled with milho spathes. For the entertainment, the ox-hide stood revealed, and looked like a big drum-skin, with an occasional patch of hair still adhering. On this bedstead, with her back against the wall, sat the old woman, resting her chin on her knees. In front of her were the three damsels, her daughters, who were to perform. Roberts and I were on the bench,

* *Pyrophorus noctilucus*, *Elateridae* (skipjacks).

trying to lean against the wall without coming in contact with the stirrups and girths of some saddles suspended above. We furnished two candles in beer-bottles to illuminate the assembly, placing the lights on the floor in the midst ; the remaining space being taken up by mine host and his wife, their six children, her two brothers, one sister, a brother-in-law, and a few neighbours and children. Our men all stood outside at the door. The "violão" (guitar) was then tuned up, and the three sisters sang in harmony.

One thing struck me, that whereas in conversation the natives are so emphatic with gestures that one can almost understand everything they wish to convey to your mind from the acting alone, the singing was without movement or spirit, and nasal ; the guitar was wiry, but the performers kept good time, and the entertainment was pleasant. Of course, the songs all referred to the tender passion, and some were rather amusing.

Between whiles I talked to the old man, who is the most intelligent person among the lower orders that I have come across, and, having been a schoolmaster, is well read on many matters. We spoke of slavery ; he is in favour of the gradual emancipation scheme. An uncle of his had by will released his thirty-four slaves at his death. He told me that occasionally, at sixteen or eighteen years' interval, there is snow at Casa Grande a finger's thickness ; but, of course, it melts in the daytime. He talked of England and the "*Lady Victoria*" with great respect ; he esteems the Queen very highly. He wished to know all about our English fazendeiros, or farmers, as he heard they were very rich. I told him something about our farmers and landowners and their increasing difficulties, especially owing to the spread of democratic principles, and explained

something of the riches of manufacturers, ironmasters, coal-owners, etc.

Some years ago the old man's wife had become quite blind from cataract. He took her down to Rio, where she was operated upon, and can now see tolerably, but only by wearing a huge pair of spectacles with circular highly convexed glasses, which, with her old wizened face, make her look just like an ancient owl. All the women get old and ugly here comparatively early ; and, with their exceedingly wrinkled and wizened faces bandaged up with handkerchiefs, they look fac-similes of the women in the pictures of the old masters of the German schools.

I spoke of the blind in England, how they not only have books which they can read with their fingers, but also a style of writing by pricking, so that one blind man can write to another, who can read it himself. He replied, "What a wonderful country England must be! Here the blind have nothing to do, and are shut out from everything."

November 26.—The singing in harmony of the blacks at their work of weeding the young maize plantations on the other side of the valley was extremely pretty, softened by distance. These blacks work about eleven hours a day, and get a milreis ; they are mostly freed slaves. Aleixo has eleven working in his plantations, four of whom belonged to an old priest who freed them on his death, and left twenty-five alqueires of land for them to settle on, build huts, and cultivate for their own use. They are fine, stalwart, pure-blooded negroes.

In the evening we had a final serenade from the same "artistes" as on the 24th, with the addition of some dancing. Roberts did the proper thing, and picked out the prettiest girls he could select, while I looked on. There

was certainly not much room for it ; but the movements of the graceful swaying and bending of the body were pleasant to watch, and the little bare feet glided prettily over the uneven mud floor to the tunes from a wiry guitar, manipulated by a man who seemed never wearied, but played on continuously, with his head bent low over the instrument, as if anxious to enjoy to the full his own music.

CHAPTER VII.

IN THE VALLEY OF THE RIO CAMAPUÃO.

Camp near Olhos d'Agua.

November 28, 1883.—It seems strange to be writing at the end of November, with the thermometer at 75° in the open, two hours and a half after sunset ; but such is the southern hemisphere in the tropics.

Our new camp is built on a promontory of campo (prairie), far above the swamps of the broad valley which surrounds us on three sides. There is nothing loftier than short grass on this summit, and as we look for miles east and west we shall have the benefit of all the air there is. The scenery is extremely pretty.

I had two visits from Doctor Rebouças at Casa Grande, on the 24th and 26th. He came to see the progress of the plans and trial section, with which he was satisfied, and was very friendly.

Yesterday afternoon my horse fell with me for the first time, but it was not his fault. I was trying to cross a piece of wet ground, when the horse went in nearly up to his haunches, and then rolled over, with my left leg under him. Fortunately the ground was very soft, so I pulled my leg out, and got him up and on to more solid ground. We were neither of us any the worse, and were off again,

finding a more passable route, before any of the men could come to the rescue.

I am most thankful to say that the carrapato torment has now practically ceased. Since the rains really began, about three weeks ago, I have only come across stray ones occasionally; but these are of a larger species, which, however, one can generally feel on their first attack, and pick off before they have buried in their heads; besides which, I now wear my nails cut pointed, in the native fashion, so as to dig them out better.

November 30.—We have felt our exposed position at nights, and the wind shakes every rope in the tent. On the night of our arrival we were awakened at 11.30 by the most terrific thunderstorm that Roberts says he ever witnessed, and he has been long in India and tropical America. The wind shook the tent about so, that we jumped out of bed, and each rushed to one of the tent-poles to prevent its bending or breaking. Some of the ropes gave way, and the outer covering flapped about. The noise of the rain on the tent top and sides, placed as it was on a bare down, was a continual roar; but the climax was the lightning, which every instant pierced the pitchy darkness, revealing everything as clear as day, followed by the most awful thunder, as if a thousand 81-ton guns were exploded and then rolled upon each other like marbles.*

Continuous rain since yesterday has kept us indoors for two days, so we have been able to attend to many matters and plot some of our work, as well as very limited space will allow.

* It might interest members of the Psychical Research Society to know that on this same night my mother and Roberts's wife dreamt (?) we were in danger, as we heard from the next letters which we respectively received from different parts of London. The two ladies were unacquainted.

December 1.—Last night I extracted a large berno from my leg, where he had been a month. He was about three-quarters of an inch long, and a quarter in diameter, the larva of a blow-fly.

December 3.—Now summer heat has fairly set in, the thermometer registered 139° yesterday, and driving the lines ahead, cutting every step through dense capoeira and jungle, is fatiguing. I have had letters from two or three friends in England very anxious to know about the geology of the district, urging me to make large collections of butterflies, beetles, and, in fact, every insect I come across; also very lengthy and most interesting letters on the botany, informing me of the special genera that I am particularly to collect. Whatever else I may do, I fear plants are quite out of the question, owing to the time and care they require. I collected a few, but they were ruined by the rains and damp, which penetrated everywhere.

It is extremely tantalizing to be in the midst of so much beauty, and to have absolutely no time except on Sundays, when I generally rest and read; the importance and responsibility of the work throws everything else into the background, and now it is getting too warm for very much exertion in addition to the day's work.

We are getting on very well, but I would not mind sending you a little bit of sunshine in exchange for a slight frost; nevertheless, there is often a fresh breeze, and it seems quite cool, with the thermometer at 75° , two hours after sunset.

December 4.—To-night is windy, after a very showery day, which, following on the great heat we have had lately, makes one chilly and cold, though the thermometer is 66° . I am sitting wrapped up in my thick poncho to keep warm.

On Sunday last, being Advent Sunday, I went to church, not having been for two months, and though everything is so different to what one is accustomed to, I dislike much the idea of never entering a place of worship for so many months, and there is no alternative ; besides which, it is a good example to my men, and people like to meet me at church, as every one is most punctual in his attendance.

I took advantage of the long ride, mostly along the valley of the Camapuão, to explore the best route for my line, and found that I shall have to cross the river several times. The third crossing is at a disagreeable spot. There is first a marsh, which is very awkward to traverse; it is some sixty feet wide. I tried to cross it, but sank over the long boots and got a soaking; then I set to work to have a lot of branches cut down and thrown in, until at last one could cross with a few inches of water only. Beyond the marsh is a belt of thick capoeira some eighty feet wide; and then we reached the river, which was so swollen by the rains that I had to go two miles down stream, where a tree-trunk thrown across affords a passage.

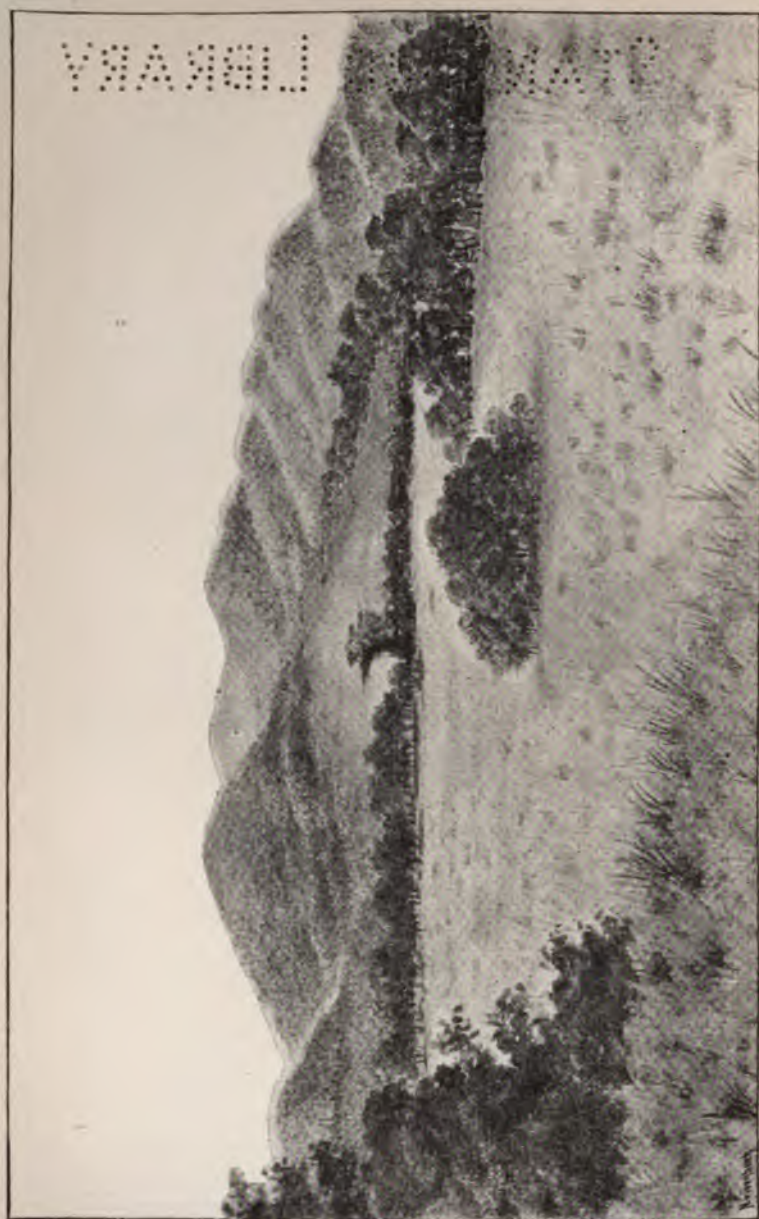
The rain, as we were led to expect, delays the progress of the work, and though one may *try* to work in a steady rain, it is really impracticable; the spider's web in one of our levels broke after one day's persevering work in a drizzle. Neither can one work at the setting out and cutting picadas without being chilled to the bone, as when the temperature is below 70° it feels very cold. To-day, in spite of threatening clouds, we started work; but soon a drizzle began, then at nine came a heavy shower, while at ten the rain came down in right earnest, vertically and by bucketfuls, so we were obliged, after trying a little longer,

to return in a drowned-rat condition to the tents by eleven. There have now (December 8) been three days of almost ceaseless rain.

December 12.—Last night we had another terrific storm. Many of the cords tying down the tent gave way, pulling out the pegs, the poles rocked backwards and forwards, the rain beat in through the door-flaps on to our beds and poured along the floor. We stood with our arms pressed against the top of the tent, so as to lessen the collapse if the poles should break. When the little hurricane had passed, in about a quarter of an hour, I went to look up the men in their tent, made two of them cut new pegs and, by the fitful yet dazzling lightning, refix our cords, while others attended to their own tent. They are so lazy that they would allow the tent to fall about their ears before they would think of repairing any broken ropes or uprooted pegs.

When the rain ceases, in the daytime it is very steamy and oppressive, especially near the marshes along the banks of the river. The steamy damp is most enervating, and I feel the effect of it to a certain extent ; for it has a tendency to make one wish to do no more than is absolutely necessary. If this went on long, and I were to continue in camp, I have little doubt that my home correspondence would dwindle down to very small proportions. It is one thing to be, in the tropics, indoors all day in a cool, dark, well-ventilated house, and quite another thing to get up early and work continuously out of doors under a sun which gradually creeps up in the sky till it is invisible, being at the zenith. One is surrounded by a thousand insects, mosquitos and wasps, and one longs for a drop of water ; but the rivers are the colour that the Red Sea ought to be, and withal lukewarm. I do not so much mind

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SERRA DO CORTUME, FROM VALLEY OF THE RIO CAMAPUÃO (LOOKING SOUTH).

swallowing half an ounce of mud in a pint of water, but I *do* object to drinking tepid water.

Camp near Village of Camapuão.

December 23.—On the 20th we shifted camp to this village, some eight miles nearer Brumado. I must first tell you one or two incidents which took place before leaving our former site.

We had a visit one Sunday from Senhor Sidney, of the Fazenda Boa Vista, and a brother-in-law, Antonio, from the Fazenda do Cortume. We talked about England, its commerce, machinery, coal, iron, etc. I could not make them understand what coal is; * they had never seen it, and I could hardly give a geological lecture in Portuguese!

I told the Capitão Sidney that they should not leave so much land uncultivated. He replied that the Brazilians are not energetic or enterprising; that it requires Englishmen for that; that they plant coffee, and sow cotton, beans, Indian corn, sugar, etc., for their own use, or sufficient to keep themselves alive, and breed horses and mules and cattle. They are very lazy, and prefer sitting on their heels smoking cigarettes, appearing to consider that work is only for slaves and women.

Another day I met the capitão on horseback just returning from Queluz, where he had been attending the courts as a juror. He told me that the jury, consisting of twelve, is chosen from a list of forty men; they get no pay, and attendance is compulsory, under a fine of fifty milreis. Regarding the state of crime, he said there are no murderers, or robbers, or thieves here among the natives or blacks, though a chicken or two may be taken from time to time; but occasionally some of the Italians or other foreigners,

* *Carvão de pedra* (Portuguese). *Carvão* is charcoal.

who mostly come to get work on the railway, though a few of them are pedlars or itinerant musicians, may commit a murder or other crime for the sake of robbery. There is no capital punishment ; the severest sentence is imprisonment for life or transportation to the island Fernando de Neronha.

He informs me that Queluz is now filling fast with people, who are building houses everywhere round about, in anticipation of the railway being opened as far as that place by the 10th of January next.

In his clearings are ten and a half alqueires * of maize, which is now coming up finely. The yield will be probably eighty carros (ox-carts), each carrying from twenty-five to twenty-seven alqueires of maize ears, which is a pretty good return.

On the afternoon of the 17th, we had to ride a long distance to meet some men on business ; it rained nearly the whole time, and the return journey of two hours and a half was through a ceaseless deluge. Having passed over a marsh brilliant with fireflies and a will-o'-the-wisp, we forded a much-swollen stream, up to the horses' girths, and reached camp at eight, thoroughly wet.

December 20.—We had ordered the ox-cart to be here early this morning to shift our camp. It was only about a mile—as the crow flies—from the ox-cart's starting-point on the other side of the valley to our camp ; yet, owing to the amount of water in the river, they had to travel some six miles by a circuitous route ; and even then, when they reached the ford, it was impassable for the cart ; so the oxen were unyoked, the cart was left on the other side, the oxen were brought over somehow, another cart was borrowed on this side, and it finally arrived at 12.30.

* An alqueire of land is the surface that can be sowed with an alqueire of seed.

Having been very showery all the morning, we had not struck the tents, but in three-quarters of an hour the packing was done, the chickens were shoved into a chimney-shaped wicker basket, the fowls, their legs tied together, were hung at the side of the cart, head downwards, the cock perched on the top gave a final crow, and we started ; a goodly company—our two selves, eight men, ox-cart with ten oxen, and four men and boys as drivers.

Just above the old camp was a horribly rough place at the edge of a huge barrancada. The wheels on one side sank into a kind of rut ; the cart was at nearly 20°, and looked as if it must tumble over ; the oxen would not move. Then began yells and howls. Some of my men jumped on the cart to prevent its turning over, others goaded the poor oxen and twisted their tails. At length they moved, and in time got up the slope. A quarter of an hour later we came to the will-o'-the-wisp swamp, and here the men found that they had not enough oxen, a dilemma we had anticipated when we saw only ten in the cart. They were again unyoked, and allowed to roam about and feed, while two men went after some more cattle. This additional delay was too much to give in to ; so, leaving all our men in charge, with orders not to leave the cart till they joined us, we rode on ahead to find accommodation for the night at the general shop of the village near the new camp, as of course there was no hope of the cart arriving that day. The cock crowed us a farewell, and was much excited at being answered by a crow from a hut close by.

On the road we came across two snakes, a jararacussú and a long thin slaty-blue one.

Arriving at the village of Camapuão, we put up at the only house available, and were not only most kindly

received, but supplied with all the luxuries obtainable. Our hostess was a charming old lady of ninety. She is the ruling spirit, very active and voluble. A son and three grown-up grandchildren—one of them a widow with one girl—do the work. They gave us an excellent dinner by the light of castor-oil lamps; a good bedroom, the door of which opened on to a verandah in front of the house, and very soft beds of maize husks; to these we retired at 8.30, tired out, and slept in sheets the first time for four months!

The ox-cart did not reach the site of our new camp till 11.30 the next day, having been twenty-two hours coming some eight miles! Such is travelling in the rainy season in Minas Geraes. We soon had the tents up, and then returned to breakfast at our last night's abode. After this refreshment, by special request, I exhibited my beetle-box, with the captures of the last twenty-four hours; and then heard an acquaintance, Joaquim Gonçalves de Souza, explaining to our hostess (the old lady of ninety, who is his grandaunt) that I went in for buying everything—humming-birds, butterflies, and beetles—to send them home to my country. Rather an exaggeration. We dined in camp; one of the chickens which had been shut up for twenty-eight hours without food or water was taken out of the wicker-work hamper and prepared for us.

On first settling down to camp-life, I was convinced that so far my tin boxes were a delusion and a snare, as they had been so battered about in the journey by rough handling that it was with the greatest difficulty I could open and shut them. This conclusion, however, has been greatly shaken on examining the condition of their contents, for on taking out (December 22) all my clothes to be aired and placed in the sunshine, I found those which

had been undisturbed since they were packed in London in June last, were as dry as a bone, while Mr. Roberts's, which had been in new leather portmanteaux, and have been aired half a dozen times since he arrived on the 29th of September, were all mildewed, and the inside of his portmanteaux were likewise quite damp. I am, therefore, in a state of mind concerning my compendium and leather trunk left since August at Paraopeba, as I allowed them to remain, thinking I might shortly return, whereas the days have been only too short to get through the requisite work, and now the track thither is impassable, owing to floods and bridges that no one can pass over.*

December 24.—As our camp is in the midst of scrub, we have cleared a space of a hundred feet square all round, leaving only a few "gabirola" bushes, which are in fruit (very delicious, quite like gooseberries), and one tree for tying the horses to, where they are fed with maize morning and evening, and among the birds which come to pick up the spilt corn are some half-dozen lovely canaries.

We were presented to-day, from a neighbouring garden, with a pretty bouquet of double dahlias, roses, larkspur, nasturtiums, jasmine, and China asters.

We had six or eight visitors on Sunday afternoon. Among them a boy of nine years old, who came with his father, and smoked abundantly, but preferred a pipe to a cigarette!

Christmas Day.—We were to have gone into Brumado to-day, having received a special invitation to dinner from the chief.† We should have numbered some eight Eng-

* This luggage eventually came to Brumado in March, 1884, and the clothes *had* suffered from the damp, a broadcloth frock-coat was all green with mildew. Everything that is unearthed even now (October, 1885) has a rank, mouldy, charnel-house smell about it, especially any papers.

† Mr. Leathom Earle Ross.

lishmen, but rain began to fall again early, so we thought it better to remain here, and spend a quiet day in camp. However, by way of a little addition to our usual food, I prepared some excellent soup for dinner, made of a packet of *riz au gras Julienne* and some Brand's essence, flavoured with essence of celery. The *riz au gras* should always be kept dry, but we cannot manage that; consequently it is now all as green as grass, and bends about like soft toffy, instead of being as hard as a stone.

During the last ten days I have suffered somewhat, first from "prickly heat," which, however, was immediately relieved and stopped in three days by taking Carlsbad salts; I have also had some inflamed scratches on my right hand, which festered and were disagreeable.

We are now meditating on our plans for Brumado, as we hope to finish up the outdoor work of this section in ten days or a fortnight, should the weather prove favourable. Town life will be very different to tent life; it has its advantages as well as disadvantages, but will be much more expensive.

There is a Lancashirism which obtains here, and which I do not think I have mentioned, that of terming men "lads," the native term being "moço" or "rapaz." Men address each other thus, and speak of absent friends in the same way; similar to the term "boys" of North America.

January 1, 1884.—There are some pleasures in being, as in our last camp, far removed from any inhabitants, and, in fact, I was six weeks without seeing one of the fair sex, or any one besides my own men, with one or two rare exceptions. There are also comforts to be derived from being camped near even such a small village as Camapuão is. Peaches are just beginning to ripen, and we can get any amount for the trouble of picking. At present they

are rather hard, but when stewed are excellent. We had a grand display for breakfast to-day, for, being a great feast, we could not work—vegetable marrows, aipim (a kind of yam), rice, beans, a salad of tomatoes, cucumber, and onion, bread, stewed peaches, melon, not forgetting the usual fowl. But with all this good food the meal was not what it should be, owing to wretched cookery, no oil or vinegar, only some pepper (the remains of some I brought from England), and salt as used by the natives, grey in colour, and each grain the size of sparrow-hail shot.

In the afternoon we had an amusing visit from four lads, aged ten to sixteen; one of them was quite a young "masher," with long shirt cuffs, a ring, and three silver-looking studs in his shirt. He smoked assiduously. They were all bright, intelligent-looking boys, in their best "bib-and-tucker," and carried little switches, though they had no shoes or stockings. The youngest was really very good looking, and all were very conversable, looking about, admiring everything, asking questions, and making remarks, very glad of the offer of a cup of *vinho virgem*; and at length, on leaving, they shook hands, took off their hats and bowed, and hoped God would be with us.

We bought a lot of aipim tubers, each about a foot long and two or three inches in diameter, with a brown skin that peels off revealing a white root; they are very good eating, when boiled, and similar to a mealy potato.

In the evening we had a visit from a band of a dozen men and boys, black and white, with three guitars and a drum. They came to celebrate the Feast of the Three Kings (Epiphany). I told them they were a week too soon, but they did not see it. They shoved into the door of our rancho a banner of white cotton. At the foot were represented two white kings, with long black beards and sweeping

garments; facing them on the right side was a black king—all had gorgeous gilt crowns; above was an allegorical design of a woman standing on the globe (which, I suppose, represented "she shall bruise thy head" *). From the right top corner of the banner streamed forth a brilliant yellow comet. They sang several hymns and carols, mostly with refrains, in excellent time and capital harmony. This serenade, in a dark pouring evening, was a very pleasant *passe-temps*. Having given them a milreis and some liquor, they went and performed again at the men's tent, so we had a repetition softened by distance.

The next day we bought about three pounds of grapes for fourpence, which, though not over ripe, were very refreshing. We also purchased eighteen cucumbers for sixpence, and two dozen green limes for threepence.

In the evening our men enlivened us by singing Epiphany hymns, and a liturgy to the Blessed Virgin Mary in harmony.

January 3.—We have now been rain-bound for three days, and so, after getting through necessary indoor work as far as we could, we had recourse to a file of papers and little books, *Graphics*, etc., which you have sent, and they proved really a God-send. A kind Manchester friend also sent me the Christmas number of the *Illustrated*, so we were well supplied, and you do not know what a boon they are to us.

After some really good work last week, notwithstanding Christmas Day, this week we could do but little so far. Tuesday (New Year's Day) was a holiday. Wednesday we went out a long way, did a quarter of an hour's work, and returned drenched. To-day, in tent all day. It is the worst bout of rain we have had, and is so depressing.

* "Ipsa conteret caput tuum," Gen. iii. 15, Vulgate.

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A TROPICAL FOREST.

January 5.—This has been our first real day's work in the new year, and I must give you some account of it.

At 6.30 a.m. the weather appeared rather finer, with detached clouds, but no blue sky. At seven it was showery; but yearning to get out again, we determined to sally forth. The showers soon became settled rain, which fell with scarcely any intermission the whole day. It was fearful work. We were engaged setting out lines through dense forests, mata virgem, capoeira, and undergrowths, on steep side-long ground. After a long morning spent in pushing and cutting my way, torn by thorns, drenched not only by the rain but by the droppings from the vegetation, I felt somewhat done up, and, as breakfast was very late, was obliged to give over work and sit down at 12.15 to rest. When the food did arrive, the man had forgotten to bring anything to drink, though we had my flask, which I always carry full of water with a dash of cachaça in it. There was no water to be had fit to drink, as every stream and rill was red, and as thick as pea-soup. We breakfasted in the picada, and tried to keep off a little of the rain by having an umbrella held over us, but numerous streamlets kept running off it, either down our necks or on to our plates.

In the afternoon we reached the mata virgem. Here the undergrowth was much less than in the capoeira, where I had been hacking away all morning, sometimes passing through lovely dells carpeted with various ferns; among which appeared tree-ferns with half a dozen light green fronds, and handsome-leaved plants; some like dracæna, others with long ovate pale-green leaves, and cycads, but all overhung by and intertwined with a network of innumerable thorny creepers; some very thick,

without leaves, but with strong curved spines about three inches apart and half an inch long, similar, I dare say, to the African "wait-a-bit" thorns; besides many smaller. There were also many trees and shrubs whose trunks and branches were studded all over by a mass of long sharp spines, some of them sticking out from the trunks in bunches, branching out like the end of a lightning conductor, about three or four inches long by six inches across. I also met with thick clumps of long, jointed, reed-like grass, or dense masses of feathery bamboos, through which it was impossible to see a yard in advance. So I went on, with at least one ranging-rod in my left hand, and my "facão" (long knife) in my right, my mackintosh torn in a dozen places, shaking off fresh showers at every step; every stitch on me soaking wet, above my waist from perspiration, below with rain; my hands scratched and dotted over with many thorns; my long porpoise-hide boots wheezing and squeaking with the water in them, and my feet slipping every few steps on the steep saturated ground or on some hidden moss-covered trunk, or stumbling against a huge dead and decayed tree, fallen but partly upheld by creepers.

On reaching the virgin forest, several large trees had to be cut down, some of them rising forty to sixty feet without a branch. With a great sound of tearing asunder the creepers and breaking off of the branches of other trees, they fell some forty or fifty feet into the River Camapuão. The course of the river itself was hardly distinguishable, except by a rather stronger eddying current, as the floods formed a red lake some half-mile in breadth, revealing as far as the eye could reach a submerged swamp, with islands of bushes and a few fences peeping above the waters.

It was a strange mixture of the picturesque, the grand, and the weird, at a time of the greatest personal discomfort.

I spent a great part of the next day (Sunday) in a manner which, though absolutely necessary, was about as far from a congenial occupation to me as anything could be, viz. drying my drenching garments of the previous day in the fitful sunshine. Twenty times or more I had to take them all in on the approach of numerous showers, and then hang them out again (on the poles we have had erected for that purpose) when the showers had passed. I know nothing more trying and irksome than this sort of occupation, when one is endeavouring to write or read ; but the result was that on Monday we had dry things to put on.

January 7.—There was a funeral to-day of a poor man who lived, or rather died, in a hut close by. The procession of men and women left the house singing, as in the other funeral I told you of. They were all dressed in their usual clothes, being, I suppose, too poor for anything else ; and, in fact, we were asked to help them last night, which we did. The dead man was simply laid on a bamboo bier and covered over with a sheet, the bier being carried by four men. How they managed to get along the road I cannot imagine. They must have had hard work to carry their burden, for you never saw such a state as the road is in now ; in fact, all traffic, even on horseback, is stopped. One can only go on foot, and risk either being waist-deep in mud or else force one's way through the bushes at the side of the road. Captain Burton states that Brazilians have told him that men who travel by such weary ways need no further process of punishment.

I must now mention the various fruits and vegetables

which are grown in this locality, and which I have eaten, or, at least, seen in gardens.

Tobacco	Pineapples	Guava	Cabbages
Coffee	Oranges	Raspberry	Black beans
Cotton	Limes	Custard-apple	French beans
Grapes	Lemons	Melons	Peas
Bananas	Figs	Cucumbers	Onions
Plantains	Peaches	Vegetable marrow	Radishes
Maize	Apples	Potatoes	Rice
Sugar-cane	Quince	Sweet potatoes	Tomatoes
Castor-oil	Gooseberry	Mandioc	Lettuce
Chillies	Blackberry	Yam (Aipim)	

This list seems to prove that almost anything will grow here. When I see the small patches of cultivated ground, and the luxuriant abundance that they yield, and then take a bird's-eye view of this broad, fertile valley, wherein but few traces of cultivation are visible, and remember it is but one among thousands, it gives a faint idea of the almost inexhaustible resources for production.

There is no population away from the main roads, no labour, and no energy in the few inhabitants that exist; the facility with which they can get their bodily wants satisfied is the reason of their being in continual, perhaps unalterable, poverty. The expense of transport, distance from foreign markets, and enormous competition would probably prevent the possibility of exporting much; but, at least, there is room for immigration on a gigantic scale to one of the healthiest climates that exists, as is shown by the success of the German colony at Petropolis.

There are no coffee plantations near here. Grapes are planted very sparingly, so also cotton, sugar-cane, oranges, and rice, being chiefly for the owners' use alone; but as the produce is always excellent, there is no reason why they should not thrive as well in large plantations as in plots of an acre or two. The only thing planted at all

abundantly is maize, and Mr. Roberts, who has had experience all over the world, says the growth here is the most luxuriant he has ever seen. It is used abundantly for making farinha (the kind of "sawdust" also produced from the mandioc root), and as flour, called fuba, for porridge. Canjica, or maize boiled in milk, is a favourite dish. The corn is also made into bread, cakes, and biscuits, as well as being used for feeding cattle, horses, and mules.

Passing frequently through the many maize-fields, the plants almost seem to grow as one watches them; and they are so strong and healthy. The seed was only sown some ten weeks ago, and the plants are now eight feet high, the stem a couple of inches thick, and the leaves three or four inches wide. Everything else is green, rank, and beautiful. But while the torrents of rain are descending and the plants are luxuriating in it, there arises at the same time from the valleys and the forests a continual steamy mist, which collects into clouds; and then, having performed its work here, it is carried off on the wings of the wind, receiving fresh fertilizing power to descend again in another place to give strength, refreshment, and luxuriance to the vegetation elsewhere.

January 8.—About two miles from here, along the valley, lives an old priest, Padre Pinto, who has the most violent antipathy to the railway, so I was in hopes of being able to steer clear of him; but unfortunately the most satisfactory position for the line is parallel to, and about twenty feet from, his fazenda. The first time we passed, the house appeared all shut up; but to-day, when we reached it, the old padre thrust his grisly, unshaven face out of one of the windows, and acknowledged our bow. As our breakfast had just arrived, we thought he might have asked us in to eat in the shade, for the sun was blazing and the heat

tremendous ; but he did not offer us any hospitality, so we had to sit on a bank by the roadside in the full sunshine, and have an umbrella held over us to diminish the effect of the perpendicular rays. Repelled by the master, we were pitied by one of his slaves, who came, while I was cutting up some slices of cucumber and onion, to bring us three cucumbers ("pipinos"), which he had just cut, and were deliciously cool, besides being younger than the one we had. While the slave was speaking to us, he often turned round anxiously to see that his master was not looking.

After breakfast, we went on working with theodolite and level through the picadas, set out on that eventful Saturday (January 5), of which I gave a full description. The scene was *so* different, and the forest beautiful, but this time the torture of the mosquitos was the objection.

January 10.—Last evening, as I was riding home from the work, I met my friend Joaquim Gonçalves de Souza, who told me that a few days back a carro (ox-cart) had unladen its contents at his fazenda, as, owing to the rains, it was impossible for the cart to go on to Brumado, which was its destination. Among the merchandise, he informed me, was a box with my name on it, consigned to a Senhor Joscelino Pacheco, at Brumado. I supposed it was the box I expected from home, which was sent off from London on November 16. Therefore, this morning I rode over there, and found that it was as I expected. I made arrangements to have it brought up here on a "carrinho," a little cart drawn by four oxen, as that was able to cross the ramshackle bridge ; and it accordingly arrived in the afternoon at the camp.

The Fazenda do Engenho—so this farm is called—is a large establishment, and, from the number of slave-huts

all round, really appears like a small village. It is situated off the main road, close by the bridge over the River Camapuão, and on the bank of the river. The owners are six brothers, who have several fazendas ; but two or three live here with their mother. They all have a special aptitude for carpentering, ironwork, and mechanics. There is a carpenter's shop and a forge, with plenty of water-power, which is taken advantage of. Among other uses, such as supplying the motive power to turbines for grinding maize, it works the "monjolo," or water-mill, which, with its monotonous creak and thud, is almost perpetually in motion. The owners were very kind, and showed me a lot of their work, which is really well done. I inspected hammer-heads, knives, etc., and was especially pleased with some plane-stocks made of scented wood, and a well-finished table with drawers, constructed of different coloured native woods. After coffee and boiled eggs, I returned to the work.

The next day the youngest of the brothers, named Carolino, came to ask me to employ him, which, having a vacancy, I was very glad to do. He has turned out a good workman, besides being very willing and obliging.

That morning we saw an armadillo swimming across the river ; my men killed him, but he was not good to eat. This species has a short tail devoid of scales.

January 12.—We had our breakfast in a cottage at Camapuão, full of women and children. The women were all busy spinning and weaving. We bought some girdles, which the natives wear round their waists ; they are strong and well made, of cotton, which is dyed with various bright colours.

About four o'clock we saw a heavy storm coming on, and so finished up in a hurry. We had only reached

Padre Pinto's house when the storm came on in right earnest. The house appeared all shut up, so we went and took shelter under a large shed in the yard. We learned that Padre Pinto had gone to Brumado; but soon a large assembly of women and girls appeared in the verandah, and they sent us a basket with about a hundred peaches, which we speedily began to demolish. The storm continued, its fury was unabated; and as our horses, for which we had sent, did not put in an appearance, we went over into the verandah, and were received by the padre's house-keeper. Among the girls was a very pretty lass, who, we were told, was the padre's niece. We were soon very friendly, conversed very pleasantly, and heard the whole history of the family, with which, however, I will not weary you. At length, as the horses never arrived, Roberts and I very reluctantly took our leave to return for dinner; and, meeting our horses in the village, were spared going on foot through the seas of mud on the high-road below our camp.

We noticed that the pigs and horses belonging to Padre Pinto were being regaled with peaches, which will show you they are tolerably plentiful.

Having sent in a man to Brumado to buy rice and a good supply of potatoes, he returned in the evening, stating there was no rice to be bought, and eight pennyworth of potatoes were all that was to be had in that city. The next day two of the nice little boys who visited us a few days since brought us two small bags of minute potatoes, for which we gave them eightpence, and they were well pleased with it.

On the 15th we had to ride some miles to a point on the other side of the river, to join in our survey to a piece that had been done from Brumado, and thus complete the

whole of the outdoor work of the first section. I had previously been over there and arranged all the details ; but we had a heavy day's work to get everything completed. To gain a footbridge, the only means of crossing the river, we had to traverse a submerged swamp. On reaching the bridge, the saddles, etc., were taken off and carried across ; and then one of the men had to go lower down the river to a ford and swim the horses across. Having accomplished this, we were able to ride tolerably near to the point where our work began. Fortunately the weather was favourable, and we suffered only from the mosquitoes. We were in the thick forest (*mata virgem*), and heard the screams of parrots, the chatter of monkeys, and saw some bright *Heliconidæ*. By working with all our might we accomplished our task, and—I must confess with some sorrow on my part—returned to camp, not again to resume any outdoor work.

January 16.—To-day has been a very busy day, cleaning and putting away our instruments, packing up and arranging the luggage, interviews with many visitors from all round the neighbourhood, who have heard of our departure and come to take leave ; one of my men wanting change for a large bank-note, another wishing to be only partly paid to-day, and to receive the remainder to-morrow ; paying off and dismissing all the other workmen ; worried by one visitor who wished to sell grapes, by a second with eggs, while a third had cucumbers and tomatoes to dispose of.

Our camp presented a lively scene, and the jabber of many voices was ceaseless from morning till night.

CHAPTER VIII.

LIFE IN ENTRE RIOS, MINAS GERAES.

Cidade de Entre Rios, (Antigo) Brumado de Suassuhy.

January 22, 1884.—We have now been in this town for five days. We came in on the 16th, having finally taken leave of every one. Our cook, Aleixo, was quite affected when he said good-bye, and hugged us both in his arms; his eyes filled with tears, he sobbed, and could not speak. As soon as we arrived here, we went to the house called *Hôtel Entre Riano*, and ordered breakfast. We next paid a visit to *Senhor João Baptista*, who insisted upon preparing breakfast for us immediately. We then proceeded to the office, and, after some business conversation, returned to *João Baptista*. His excellent food was doubly enjoyable after our camp fare, and his kind welcome raised my spirits after the depressing influence of the past few weeks.

I fear I forgot to mention that two days after Christmas this benevolent man came to pay us a visit at the camp, bringing some bread and cakes and three or four bottles of wine.

Returning to the hotel, we arranged to hire the house we are now living in; it is opposite the hotel, in the main

street, near the principal houses. When I was here before it was the post-office.

The terms are a hundred milreis a year. The house has only one story, which contains one large apartment some thirty feet square, to the right and left of which are two small rooms—the one our bedroom, the other Roberts's dressing-room—which all face the street. I have also a dressing-room; and there are besides two storerooms, a large kitchen, a bakehouse, and an outhouse. The principal rooms are about fifteen feet high, and are ceiled with plaited bamboo; but there is only an uneven mud floor throughout, except in our little bedroom, which is boarded. We have two windows to the street, which are glazed. Our bedroom possesses three doors, but no window; and the other rooms have no casements, only the usual shutters.

The bargaining for the house was just completed when our ox-cart arrived; and when we had stowed away all our property, we came to the conclusion that a little furniture might be advisable, as all that was then in the house were two long forms in the large room; so after a few inquiries we secured a bedstead for me, and a little table, which we use at meals, and also for our drawing-board during office hours.

My health has improved wonderfully, even in the short time I have been here. I told you some weeks ago of two sores on my right hand, which I thought were poisoned scratches; they improved; but shortly afterwards every scratch or bite that I had on my hands, or legs, or face, festered in the same manner. A brilliant scarlet line of inflammation ran up each arm, and my right leg was so swelled I could hardly walk. Otherwise I was quite well; but never having a sore before, I wonder much what occasioned them, and suppose it was want of butcher's meat,

for since I have been able to get that I am rapidly recovering. This infliction was far worse than carrapatos, besides being horribly disfiguring; and my appearance, when I came into town with both my hands bandaged up and in slings, excited great compassion.

January 25.—I saw last night a fine comet, due west. It set about 9.30 p.m. The weather has been magnificent and cloudless the last two days, but beautifully cool in our house—only 78°.

February 1.—The townsfolk are very friendly, but Sr. John Baptist is the most benevolent of all. A week ago he sent, one morning very early, a large trayful of cakes, biscuits, bread, and *compote* of apricots, with his card, "begging forgiveness for such an insignificant remembrance."

I have already described our house. I must now say a word or two about our garden, which is bounded by stone walls on three sides, and on the fourth by a mass of huge cacti (*Cereus sp.*) thirty feet high, now just coming into flower. In it are some orange trees, and many coffee shrubs (*Coffea Arabica*), which are now both in flower and fruit, but are wild and uncared for. The walls are overhung by the huge leaves of a plantation of bananas (*Musa*) in the next garden.

A little further up on the other side of the road is a very extensive house, but only of one story. According to the invariable custom which obtains here with all the larger habitations, a large shop or general store is the prominent feature, with one or two public sitting-rooms out of it. The house referred to belongs to Senhor Joaquim Ribeiro de Oliveira. This gentleman has two or three sons, two little girls, and a grown-up daughter, who is a very accomplished musician. Senhor Ribeiro paid us a

visit the other day, and invited us to go and hear her perform, which we accordingly did the same evening, and spent a very pleasant three hours listening to her delightful playing. She practises two hours every morning, besides her performances every evening, and when her windows are open we can hear each note. She is very small, and has minute hands and magnificent eyes, and is certainly the best-looking girl in the town. She plays brilliantly, *con amore e espressione*, and it is a great pity she is buried here. I like her father, though he has not much to do with John Baptist and his set; for politics run very high in this place, and the former is a Radical, while John Baptist is a Conservative.

Intermarriage within the prohibited degrees is carried on to an alarming extent in these parts, either by the reprehensible system of indulgence by the Holy See, or by ignoring its commands; perhaps more frequently the latter, as some of the sensible and thinking men, though religious, are not blind to the many errors of the Roman Church. As to the sad result of one of these marriages, a gentleman here, with a family of two sons and two daughters, has one son and both daughters deaf and dumb! The younger girl is an intelligent child of thirteen.

I went to see Senhor Baptista on Sunday after breakfast, and met his two sons, who have just returned from a visit to Portugal and France. On their homeward journey they called at Southampton, but did not go on shore. I told them they made a great mistake not to visit London, at least. The elder son is very pleasant, talkative, and clever; he lives at Juiz de Fora, some hours by rail below Barbacena. The younger son, who is deaf and dumb, came to return my visit in the evening, and though I can manage to converse with Brazilians who can

talk, I found it somewhat difficult to hold communication with a mute in Portuguese. However, he was very bright and pleasant, explained to me the deaf and dumb alphabet, on one hand only, and inquired as to my health. We then, by writing, spoke of Paris and Lisbon, and I finally showed him some *Graphics*, which he liked.

One of our men left here to-day (February 1) for England. He was chief of the third section, and suffered much from fever on the banks of the Para. He came in here very ill soon after we arrived, and had no appetite. I dosed him with Warburg's tincture,* and the effect was marvellous; his appetite returned, and when he left he was a different man.

Yesterday the assistant engineer of the fourth section came in invalided to go home. He has had two bad attacks of fever, and was delirious for four days at Pitanguy. He is now suffering much from *bernos*, of which he extracted seven yesterday and three to-day. His wounds are severely inflamed, and the ride of a hundred miles down to this place has, of course, intensified the evil. He and his companion, chief of the section, have also fallen in with many jiggers ("bichos de pé," they are called here), having had two or three under every toe-nail. They often lodged in huts and cabins, where these insects are always found. So far, I have escaped them.

After dinner, at sunset, we sit outside our door, to enjoy the cloudless sky and balmy air after our day's work, on

* Warburg's tincture is certainly a wonderful medicine. It has never failed. On one occasion half a bottle effectually cured a bad attack of dysentery. This, with quinine and Cockle's pills, were the only medicines I administered. When the latter once became known, I was continually being applied to for them, and was glad to find they did not deteriorate after the box had been opened some time and exposed in camp to the all-pervading damp, which made the pills quite soft.

the raised platform, from which four steps descend on each side to the street, and from thence we watch what is going on. The quiet is remarkable ; there are sometimes a dozen people of various colours passing, but being all shoeless, or occasionally in slippers, their tread is noiseless. During the day there are horses, mules, travellers, ox-carts ; but at night all is still, and lights are put out at 8.30. At seven in the morning all the shops are open, and there is a busy traffic. Even by six a.m. there are boys selling milk and bread, and women carrying water, and every one seems to be up and about.

As a change, the life here is not unpleasant for a time, while the warmth is delightful. I think I have mentioned that in no room is there any fireplace or stove. Our kitchen grate is merely three stones in the middle of the floor to keep the wood in order, and the smoke finds its way out through the door or the interstices of the tiles ; while our old hag, the black cook, who has two projecting front teeth, squats on the floor preparing our food, retiring at intervals to her spinning-wheel, or going into the back house to attend to some indigo she is preparing, by steeping in water, to dye the cotton, which is woven in a handloom into coverlets.* Her two youngest boys play about in the garden, the elder occasionally running out on messages. The ancient dame, though "ugly as sin," is very useful—roasts and bruises the coffee, fetches water, cooks, and does everything we require, for which we pay her ten milreis a month.

I went to service last Sunday for the first time this year. The church is a well-constructed building, with a grand though rather tawdry interior, and it has three

* "Indigo grows everywhere wild, and gives that fine purple gloss which rivals the produce of Hindostan."—Captain Burton.

altars. There is also a chapel, with a good exterior, but much less decorated interior. The service was reverent, but I disliked one feature connected with the hymns. Two or three were started at intervals, sometimes by the men, at other times by the women, and very well sung in harmony, without accompaniment; but they were disturbing, first, because they were generally addressed to the Virgin, and secondly, they distracted one's attention from the Great Service, as the priest's voice was drowned thereby; and but for the genuflections and bell-ringing, it was difficult to discern what part of the Liturgy was going on. There was no sermon. How I long for the same service at our church, where, at least, one is quiet and one's thoughts undisturbed!

February 5.—There have been several changes lately. Mr. Large, chief of the second section, who lived in a house with two other members of the staff at the other end of the village, has now come to live at the hotel opposite. My good partner, Roberts, is soon leaving, but I intend remaining alone in this house, as it is large and airy; besides which, the privacy and quiet are very great considerations. At the small house, yclept hotel, there is no privacy. Being the post-office, the mails come in every other day in the evening, leaving at about seven or eight the next morning. When the mails arrive, the whole village is in and out of the hotel, in which the only three bedrooms open into the main room—call it as you please, post-office, hall, or general reception-room.

The postal arrangements are of the simplest and most unsatisfactory description. The mail-bags arrive on mule-back; they are then brought into the room and opened on the mud floor, in the midst of a surging crowd all anxious for letters, etc. The postmaster has a table on which is

placed a candle, sometimes in a candlestick, oftener propped up against some support; the letters and newspapers are then portioned out into several heaps for the principal people in the town, the remainder for nonentities placed together in a bundle, those which have again to be sent off to different places are placed apart. Then every one seizes his own parcel. Confusion, as may be surmised, often occurs.*

I bought to-day a sixpenny bottle of Pink's Oxford and Cambridge Sauce, for 1280 reis, that is about 2s. 1½d! I wanted Worcester, but could not get it. Some sauce is really needed to help to disguise the bad cooking.

Our cook always goes home soon after dinner. To-night she and her children went out, extending their hands as usual, asking for our blessing, while we were listening to the delightful music of "Semiramide," followed by "Écoutez moi," and other choice pieces, from the piano of the pleasant and talented young lady over the way.

The Feast of the Purification (Candlemas Day, February 2) was a grand "festa" here. The town was filled with gay throngs, and the church bells kept ringing the whole day. In the evening there was a great "baille," or ball, to which some of the staff went. It was kept up till midnight.

Our office is in the chief's house, some five minutes' walk down the street. It has a large garden, in which are many apricot trees, now borne down by the weight of their fruit; but, as usual, the trees are practically wild, no care is ever bestowed upon them, and it is hardly possible to pick off an apricot that has not, at least, one worm or

* Owing to our remonstrances, and after writing a letter to the head office at Rio de Janeiro, a slight amelioration was eventually effected, and at least the incoming letters were marked with the dated office stamp, which, before our protest, was as a rule dispensed with.

maggot in it. This is only one specimen among a dozen others of the indolence of the natives.

On Sunday afternoon (February 9), I went to see John Baptist, and found that the fiscal engineer of the province, Dr. Amerigo Brundão, had arrived from Ouro Preto. I was introduced to him, and we had a long talk about the railway. The next day he went through all the work we have done, and on Tuesday, accompanied by Dr. Rebouças and the Public Prosecutor, came again and examined the plans. They expressed themselves well satisfied with the route chosen, as well as with all the details.

February 14.—I have already told you we can get butcher's meat here. The beef is called "carne de vacca," *i.e.* cow's flesh. They never kill bullocks, or even cows till they are worn out, therefore the meat is not of the best, being always full of muscle, but still it *is* meat. It costs threepence a pound. Kid flesh is excellent. A kid costs from one milreis to a milreis and a half, and is equal to lamb. We had half a kid the other day, which lasted Roberts and me for two days—that is, four meals. It was roasted for us at our chief's house, and with mint sauce and new potatoes was delicious. We have also enjoyed, through the benevolence of our chief, the fore quarter of a young pig, roasted, with sage and onion stuffing, which was superb.

The roast meat is cooked in native ovens, semicircular in form, made of blocks cut from the huge termites' nests, which are hard as stones. The natives often convert the actual nests themselves into ovens.

While talking of food, I may mention that our "chutar hasri" (Hindostani for early breakfast) consists of bananas, peaches, apricots, or pineapples (which cost twopence or threepence each), with coffee, and milk and bread. After

working till eleven, we then have a meat breakfast, with wine.

February 18.—Early this morning my colleague and companion, Mr. Roberts, left for England, so now I shall be alone. I fear that without him I should have been in a sorry plight, perhaps obliged to go on the sick list, as owing to responsible and urgent work I was ignoring personal comforts altogether, forgetting that one must attend to many irksome affairs in order to keep in health. It is not paying him much of a compliment to say it was pleasant to have an English companion; but besides the kind way in which he was always ready to fall in with my ideas of the work, his long experience was invaluable in the difficult task of managing the men, though, having been longer in the country, and therefore speaking the language better, I was generally the mouthpiece. The four and a half months we worked together will be a very pleasant part of my Brazilian trip to look back upon.

I have omitted hitherto to describe Brumado, so must now say a word about it. The town is built on the top of a hill, overlooking a broad valley, which runs north towards the river Paraopeba. A glance at the map reveals its lofty position, near the head waters of the Para and Paraopeba. The town is some three thousand feet above the sea, and all the principal houses are in one street, which runs about north and south. At the southern end is the chapel, the guard house, and prison, the government school, also private houses and huts. Just below my house is the first shop, kept by Joscelino Pacheco de Souza, brother-in-law of John Baptist, where I get all my provisions, candles, etc.; then comes the hotel. A small chapel or oratory, which is always closed, separates the hotel from Joaquim Ribeiro's house, opposite which, next to me, resides the sister of

Padre Pinto with her family. Her husband is a collector of inland revenue. Next to Joaquim Ribeiro lives Francisco, the man with a glass eye, brother of John Baptist. Passing another large shop, the abode of Senhor Espiridião Ribeiro de Oliveira, and a new house in course of construction, we reach the "Juiz diretor," the judge, Dr. Amador; and opposite to him lives the Advocate Randolpho Fabrino. We then arrive at the church, which is on the highest ground, the street ascending from my house to this point. From the churchyard, which is surrounded in the ordinary way by a low wall, is a grand view of the valley, extending for miles, with the Ouro Branco Mountains in the distance. John Baptist's house, of two stories, and one of the finest in the village, is opposite the church; and on the other side of the road, which at the church widens out to some hundred yards, lives João, the brother of Joaquim Ribeiro. Further on resides the Public Prosecutor. Beyond this the street falls and gradually narrows, all the houses (with the exception of the one next to João Ribeiro, where lives a dear old gentleman, Commendador José Joaquim d'Oliveira Penna) are one storied and insignificant, most of them being huts. Our chief resides in a large roomy house further on. At the extreme northerly end of the village, near the cemetery, are four or five fine houses, at present uninhabited. They were in a very bad state of repair when I first came here last July, but John Baptist is now doing them up, and one of them he intends to be a Grand Hotel when the railway is opened.

After passing these last houses, the road descends rapidly over a barren red waste to the Rio Brumado, on the banks of which will be our station, some half-mile away from the town. Dr. Rebouças was telling me the other day his arrangements for the passenger traffic on the line, which are as follows :—

The express train, which stops at every station, leaves Rio de Janeiro at 5 a.m., and should reach Paraopeba station before 6 p.m. (This name is now changed to Christiano Ottoni.) Passengers for Pitanguy will there leave the broad gauge (one and a half metres) Government Trunk Line, and, getting into the narrow gauge (one metre) train, will proceed to this place, arriving at 7.30 p.m. Christiano Ottoni is in the midst of uninhabited forest land, and not very agreeable to stop at. The journey to Pitanguy will be resumed the next morning. Such is the proposal. When will it be carried out?

In my brief description of Brumado I have only mentioned the main street, wherein many of the houses have two stories. That street is on the ridge of the hill, which slopes down on each side into pretty lateral valleys, thickly dotted over with the huts of the poorer population of all colours. A good deal of the land is under cultivation, and there is a network of paths and lanes amidst most luxuriant bananas and other vegetation. It is a far more interesting and picturesque part of the town than the main street; while in one spot is a first-rate hunting ground for butterflies, especially *Ithomia*, *Heliconius*, *Anartia*, *Heterochroa*, *Colænis*, which are the most abundant, though there are many others. I need hardly say I often come back from the office by one of these side paths.

March 3.—We have had as hard work almost as in the parliamentary season in England, (though we have never worked after sunset, but that is quite enough for the tropics when under pressure,) to complete and despatch the whole work of the first section by the 1st of March. The work included plan and section, estimate and quantities, drawings of permanent way, type bridges, and culverts, tables of curves and straights, gradients and levels, culverts, etc.

And everything was in duplicate. We had just finished on the night of the 29th of February, when a letter came by special courier from the fiscal engineer at Ouro Preto, requiring additional information, which meant another day's work. But we finally sent the whole to the President of the Province on the 2nd of March.

March 10.—This evening there was a curious and weird atmospheric phenomena—a lunar rainbow, the first I have ever seen. It was very brilliant, a full semicircle, and was backed by a mass of inky black clouds, which were lighted up every moment by lightning.

Yesterday, being Sunday, I went by invitation to breakfast with Senhor Joaquim Ribeiro, to meet Padre Francisco of Olhos d'Agua, at eleven. He had received a letter from a relation who is a Government official at Ouro Preto, stating that the President of the Province was inclined to reject my plans of the first section, preferring a route *viâ* the valley of the Paraopeba. This is evidently owing to the influence of the São João del Rey Railway Company, to which I refer elsewhere. I thereupon went through the pouring rain to the office, and brought back the map. I also produced the Concession, and referred to the official Government Reports on the subject; and, after a long argument, convinced my hearers—for by that time several other men had come in—that the route I have selected, while entirely according to the Concession, was not only the shortest route to the Côte (Rio de Janeiro), which is important in view of through traffic and extensions beyond Pitanguy, besides those authorized to São Antonio dos Patos; but that it is also the best, and the only one that could conveniently pass by this town, which is the most important one in the neighbourhood.

I then went on to John Baptist, and he compelled me

to dine *en famille* at three, for which I was hardly prepared after a substantial breakfast such a short time before. I told him of the difficulty that had arisen, and recapitulated the vindication of my route, with which he entirely concurred, stating that he had no doubt the President had been influenced by the opposition of the company I have referred to. Senhor João Baptista is very much interested personally in the direction the railway takes, as by following my proposed course it will, on leaving this town, pass for some three miles or more up a valley which is owned by him, and is all in cultivation; but, with a true spirit of self-sacrifice, he is willing that his land should be taken, if it be necessary for the public good. On leaving him I went to the office, and reported my interviews to our chief.

Since Lent began there have been two or three communicants every Sunday at the ten o'clock Mass. It is the first time I have seen people receive the Communion in Brazil; but the members of the Roman Church are less careful in that matter than the devout members of our own Church. Can it be owing to the preliminary compulsory confession? Before Ash Wednesday the priest announced that during Lent meat was only to be eaten once a day, but on Sundays two or three times, if required.

March 20.—Occasionally foreign wanderers pass through the town. A month ago two murderous-looking cut-throats put up for the night at the hotel, in an outer room. They were taken in free by the landlady, as they stated that they were sellers of "holy pictures" and were very poor. Later in the evening, however, they were found counting piles of bank-notes. They went away after remaining two days; but as they, sitting at their door, watched me outside mine, knowing I was alone in my

house, I thought it well to give my large, nickel-plated army regulation revolver an ostentatious cleaning, and load it before their eyes. To-day, two pretty little Italian boys were roving about the town with violin and harp, playing and singing. I believe they made a good thing of it; but their father, who kept in the background, took the money.

Guavas are now abundant; they began to come in about ten days ago. I found one or two ripe near the river, a week ago, and being very thirsty, after a Saturday afternoon spent in catching lepidoptera, I ate them. They are by no means pleasant to taste when raw, and have a peculiarly disagreeable smell; the delicious and delicate flavour only appears after cooking, and they are even more succulent when the fresh fruit is simply skinned, cut up, and stewed with a little sugar, than in jelly or marmalade. The latter is called "goiabá," and is most excellent; it is very generally made here. *

This week the townsfolk have begun to weed the street and mend the road in preparation for the crowds of visitors who come here for the Holy Week.

It was only to-day that I was able to have the mince-meat made up into mince-pies which you sent in the box that arrived on January 10. But it was in perfect condition, and we all enjoyed it much, though rather late in the season.

March 23.—To-day Aleixo, our former cook, came to pay me a visit, and to ask me to house him and his wife and one or two brothers-in-law during the coming "festa." I did not at all like the idea, but was compelled to assent with as good grace as I could. In the afternoon I dined with John Baptist, as I often do. The parish priest, Padre

* On leaving Rio de Janeiro for Europe, I bought a large quantity of it, which was much appreciated in England.

Antonio, was there, who said grace at the end of dinner, after which a slave brought in a basin, and warm water was poured over our hands. It is always the rule after this ceremony to adjourn to the reception-room, which is very large and lofty, and commands a magnificent view from the windows in two directions. The only furniture in the room consists of two small tables and two settles, with a number of chairs of Austrian bent wood. On the walls are a few photographs, a portrait of Pius IX., and two little English chromo-lithographs, which I have long known and liked ; one represented a smiling, light-haired, blue-eyed child, playing with a daisy-chain, and the other a little girl asleep.

At sunset there was a pretty funeral of a little child. A man carrying a cross went in front, with another bearing a lighted candle on each side ; next came the priest, in a white and gold cope ; then followed the coffin, covered with pink stuff and silver lace, carried by six little boys ; while at each side were four little girls (*anginhos*) dressed in white, with veils, carrying candles. The village band closed the procession.

Nearly every one in the village is suffering from coughs and colds, which they call "bronchito-asmatiko." We have all had it more or less, while Mr. Large has had really bad bronchitis.

March 30.—To-day being Passion Sunday, there was a special service. All images have been removed ; the gaudy super-altar, with all its appurtenances, was hidden by a large mauve curtain ; the crucifix was also shrouded, and the curtains of the tabernacle were of mauve-coloured silk. There were only six candles burning during Mass, instead of the usual twenty or thirty, and no ornaments. There was but one communicant.

Two slaves were engaged the whole day in plastering

the outside of Joaquim Ribeiro's house, not even leaving off during Mass; and yet it was thought fearful of us to work at the office on Lady Day!

March 31.—To-night arrived intimation of the approval of the plans of the first section by the President of the Province, and there were great rejoicings. A crowd, headed by the band, patrolled the street and went down to the office, where a speech was made in honour of our chief. I was in Joaquim Ribeiro's shop when the crowd arrived there, and in one of the speeches my health was proposed. Joaquim then responded, and threw open his shop for any one to come in and have a drink, and I received many congratulations. Padre Pinto, who has been staying with his sister for some time, sent me over a special message to go and see him about the railway through his land; but I was unable to do so till the next day.

April 6, Palm Sunday.—I was disappointed that here, in the country of palms, no notice was taken of to-day in the way of special devotions, the only differences being that red vestments replaced the green and yellow which have been in use during Lent, and the service was that apology for a Missa Cantata which obtains here, viz. a series of most disturbing voluntaries played on the harmonium throughout the service, rendering it impossible to catch a word. You know how lengthy is the Gospel for Palm Sunday, and can imagine how edifying it must be to the people when read by the priest in Latin, in a low voice, turned towards the altar, during a loud performance on the organ! The only indication I had of how much had been read was when the priest ceased for a minute and prostrated himself before the altar at the words "*Iterum clamans voce magna, emisit spiritum.*"* Certainly one of

* "When he had cried again with a loud voice, yielded up the ghost."

the first reformatations in the Roman Church should be to have the services in the vulgar tongue, or at least the portions of Scripture.

There are to be five processions through the town this week. Tuesday, "Nosso Senhor do Deposito" (the Way of the Cross); Wednesday, "O Encontro" (the Meeting); Thursday, "Nossa Senhora dos Dôres" (Our Lady of Sorrows); Good Friday, "O Enterro" (the Burial); Saturday, "O Triumpho" (the Triumph).

April 8.—This evening was the first procession, which started at seven. It was "The Way of the Cross." The church bells began ringing at five, and continued at intervals till all was over. The service began by choruses and some music played by the band in the chapel at the south end of the town, the priest in a purple cope meanwhile swinging a censer with incense, from which arose clouds of smoke, in front of a life-sized figure of our Lord—kneeling under the weight of His cross—clothed in a black robe, which reached from head to foot, and was fastened round the waist by a white cord. The procession was headed by a crucifer on whose cross were fixed the implements of the Passion; he was followed by a great number of men walking in two rows in Indian file, each carrying a lighted candle. In the midst of this procession was the figure of Christ—now veiled in purple, so that only part of the cross could be seen—borne by four men, preceded by a thurifer swinging the censer; and then came Padre Antonio in a purple cope, with two other priests in cassock, surplice, and biretta. Arrived at the church, all candles were extinguished, a gauze veil that hung in front of the chancel was torn down, and the Figure was placed on a stand before the altar; the chorus, etc., was repeated as at the chapel, and at the conclusion of the service most of the congrega-

tion pressed forward to genuflect and kiss the end of one of the cords.

It was certainly an imposing ceremony. Being a dark evening, the light from hundreds of lanterns, which were hung outside all the windows, besides the flaring candles in the procession, made the scene picturesque, while a heavy thunderstorm just before, and continual lightning all the time, added to its solemnity. Everything throughout was conducted very reverently and decorously, though there were crowds in the streets, most of whom knelt on the damp ground while the procession was passing.

April 9.—Since last Saturday people have been arriving from all the country round in daily increasing numbers, and the town is now crowded. Two most extraordinary vehicles passed the office to-day, the only kind of conveyance, other than ox-carts, or sheep- or goat-carts, that I have seen since I left Rio—eight and a half months ago. Imagine the body of a chariot, bereft of coach-box, springs, and wheels, with two long poles braced to it across the doors, borne by one mule in front and another behind! Inside were women and children of some of the more aristocratic fazendeiros; but the vehicles looked brown with age and the use of past generations.

Scattered along the main street are six small oratories, capable of holding half a dozen people. They have all been cleaned out and decorated for this week, and the entrance adorned by a huge palm leaf on each side. Each chapel has a small altar, with six candles, and a painted altarpiece of more or less artistic merit.

Picture my surprise on returning from the office at being met on the threshold by a little angel—the youngest son of my cook. I had never seen him otherwise than as a dirty youngster, whose only apparel was a ragged shirt;

but now he was clean, and got up regardless of expense. On his head, a wreath of artificial red roses and leaves, tied behind with two broad blue ribbons which reached to his feet; a white muslin frock, trimmed with gilt tinsel lace and red roses; two wings of purple and white feathers; long white drawers, frilled and worked; white stockings; and a beautiful little pair of boots. Such a change!—I did not recognize him at first. He was going to take part as an *anginho*, or “little angel,” in the procession of the “Encontro,” or Meeting of our Lord with His Mother.

By half-past five there were streams of people wending their way to the church, and many little girls dressed in white, with long tulle veils and wreaths of artificial white roses with green leaves, all carrying white pocket-handkerchiefs. The first procession was the same as I described last night, which, leaving the church, went up the village by the chapels to the Calvary, or large cross, at the north end of the town. It was preceded by a man in a long black robe, a false beard reaching down to the waist, and a tall hat like a fool’s cap. He went along producing horribly discordant sounds upon a horn, and was supposed to represent Judas! Meanwhile all was being prepared in the church for the second procession—that of Nossa Senhora dos Passos. This consisted of a number of men carrying candles, who, with a band of sixty girls and my boy, went from the principal church to that of St. Antonio, to bring thence the image of Our Lady. The little girls were mostly in white, but some were in very fantastic dresses of various colours, or of cloth of gold or silver, and with real swan’s wings on their backs. Two of them were the little daughters of Joaquim Ribeiro. The two processions met—coming from different ends of the town—just opposite the church, when a sermon was preached in the open air

from a pulpit which had been erected for that purpose. The preacher was very eloquent, and the sermon was stirring. A litany was then chanted, every one kneeling, after which the two processions joined into one and went down the village, stopping at one chapel, and then returning to the church in the following order :—a thurifer swinging a censer, from which proceeded clouds of incense ; then the figure of Christ, followed by the Virgin, dressed in a violet silk dress and blue cloak, both of damask ; next came the sixty young girls ; then the Host, carried by a priest under a canopy held by six men. The procession was of great length, as there was a row of some three hundred men on each side of the road, each man holding a lighted candle. A huge company of women and children followed behind.

On returning to the church, the Host was censed and replaced in the tabernacle ; the sixty girls seated themselves on the altar steps, and a packet of sugar-plums was given to each of them. The church was crowded—women in the nave, men in the chancel—and then Padre Antonio, climbing up into the pulpit by a ladder from outside, preached another sermon. He ranted and raved so much that I could hardly make out a word he said, but the sermon closed with a scene which apparently moved the people greatly. Speaking of the scenes in the Judgment Hall, he said, " This was the beginning. What was the end ? " and, pointing with his finger towards the altar, a purple curtain was drawn back, revealing a cross with life-sized figure of our Lord on it, and the Virgin standing at the foot. I dare say this kind of appeal to the senses may influence the uneducated minds of the people, as pictures are useful to children by conveying ideas more forcibly than mere word-painting ; but, of course, there is much in these processions and goings-on which is repellent and

objectionable, according to our more enlightened ideas. The service was concluded by another litany.

April 10.—To-night was the procession of Nossa Senhora dos Dôres. It was composed of the sixty girls, the Virgin carried by four men, the Host, and a band, and was followed by the usual crowds. After walking all through the town there was a sermon in church; and at 10.30 the image of the Virgin, which had remained for three hours in the church, was escorted in procession to the chapel of St. Antonio.

The townsfolk are much disturbed at our working every day in the Holy Week except Good Friday; but, though I am very sorry to appear to do anything to give them offence, I cannot see wherein our working in the office differs from their keeping their shops open all day. However, *nolens volens*, the world must proceed.

For the last two days I have been living with the sword of Damocles over my head, expecting when I returned in the evening to find my self-invited guests installed. I have laid in a store of provisions for them—rice, beans (*feijões*), eggs, and salt cod (*bacalhão*). I reluctantly gave permission for three or four men to sleep in one room—Roberts' dressing-room—but said I had no accommodation for ladies. In this tittle-tattling little town it has been spread about that "the doctor is going to have a houseful, and several girls!" I have, therefore, been in a horrible fever of anticipation, which this evening resolved itself into certainty. On returning from the office I saw three women and a lad seated on my doorstep, and on entering found that five women and this lad were already installed, and they told me that more were coming. Three of the ladies were the sisters of Aleixo's wife, of whom I have told you as entertaining us at Casa Grande with music and singing;

the other two were girls, whom I knew by sight, from the same village—one of them was rather pretty. They gave me a letter from Aleixo, stating he was very sorry that he and his wife were unable to come, but that his sisters-in-law, brother-in-law, and some "compadres,"* *i.e.* relations, would accept my hospitality. Shortly afterwards the others arrived, and then my guests numbered ten in all—three men, five women, and two slaves. Oh! was it not delightful? The five women all took possession of Roberts's small dressing-room, the two slaves were in the store-closet of my large room, and the three men slept in the principal room. They brought any amount of mats and bedclothes, and twelve horses and mules. Fortunately they arranged for the pasturage of the animals, so I had no trouble on that score. All the saddles and horse-trappings, etc., were stored in the closet where the two slaves slept—my wine-cellar, only filled, however, by empty bottles.

Besides the stock of provisions I mentioned as having provided, I had also laid in two bottles of cachaça, which latter were emptied by my guests, the ladies, before I had the pleasure of meeting them.

April 11, Good Friday.—I had arranged with my cook that the guests were to prepare their own food, so that, at least, she might not have additional work; and I assigned

* I must here say a word about the term "compadre." Strictly speaking, it is a religious expression, and has reference to the spiritual relationship in which the godfather and godmother stand to the parents of their godchild. It is their "afilhado" or "afilhada," according to sex; they are the child's "padrinhos," and are the "compadre" and "comadre" of the child's parents. But these two last terms are applied with a wide meaning to other friends than those who are thus spiritually connected. For instance, a wife sometimes calls her husband "compadre," and *vice versâ*. The ties of this spiritual relationship, however, are very highly considered—in fact, as much as ties by marriage; and a man who consents to be a godfather in these parts has entailed upon him a multitude of duties, and incurs an amount of responsibility which is unknown amongst us.

to them an outer kitchen, where was an oven for their use ; but they preferred to use mine, though they did their own cooking, having arranged everything with my old beldame, with whom they were immediately on the best of terms. I had also arranged that they were to have their meals whenever they chose, but that I must have mine separate. To this they would not consent, but said I must breakfast with them this morning, to which, of course, I was obliged to submit. They had a filthy stew, reeking of garlic, composed of bacalháo (salt codfish), rice, and feijões. You have no idea how repelling these black beans look before one is accustomed to them. There were also "repolhos," or greens, and farinha. I had not thought of supplying them with wine, but as I was with them I could not keep the bottle to myself. Fortunately only five of them were present at breakfast, so we only drank the one bottle of red wine, which was all I had in the house, and which they much appreciated. Oh, the loathsomeness of that meal, especially when one's mind wished to dwell on the awful tragedy we then commemorate !—eating with fork, or spoon, or fingers, spitting out bones, etc., on the floor ; and finally, at the end of the meal, came the last straw, when every one went to the pipkin of water in the corner of the room, took out half a tumblerful, rinsed their mouths, and spat it all out on the mud floor—anywhere, just where they stood.

They all went out about eleven, and I had a nice quiet time till 2.30, when they began to return, dropping in by twos and threes, and we had dinner together at 5.30.

There was no service here to-day, which I consider extraordinary, especially as there are now four priests in the town. I asked Padre Antonio why he did not have a Mass of the pre-Sanctified, and he shrugged his shoulders.

In the evening was the "Procissão do Enterro" (Procession of the Burial). The general features were similar to those I have before mentioned—men with candles, and crowds of women and children in the rear. The cross with the instruments of the Passion led the way; then came the sixty maidens; next the thurifer; then, under a baldequin, a bier with a veiled figure of the Christ upon it, which was borne by eight men, in turns of four each, all in white, with white hoods on, tied under the chin. The figure of the Virgin followed, carried by eight ladies, alternately by fours, all dressed in black, with long black veils. On each side of the bier was a priest, and a third priest closed the procession, which was about half a mile long. It went throughout the village; and two ladies were dressed up to represent St. Veronica and St. Mary Magdalene. At intervals St. Veronica held up a cloth with a representation of our Lord's head upon it, and every one fell on their knees while she sang a recitative.

In the evening I had an interesting talk with the men, especially with Aleixo's "cunhado" (brother-in-law). I had previously given him a Gospel of St. John; and some time after he walked—one Sunday—about two leagues to my camp, and saying that I had told him I possessed a copy of the whole New Testament, would be so glad to have a look at it. Of course I lent it to him, and he took it away, and, sitting on his heels outside my tent, had a long read. To-night I gave him a Testament, with which he was much pleased, and told him I had sent to England to get it especially for him. He then and there sat down and read the whole of St. Luke xxii., xxiii., aloud, which took some time, as he was continually drawing the attention of his friends to certain passages which especially interested him. We then had a long talk on those sub-

jects, and I pointed out to him many passages, all of which he read aloud, and was very much interested in the Revelation to St. John—a book he had never heard of. Of course, his mind was very crude, and my theological Portuguese none of the best; but by pointing out passages he understood something, and said he would study the Book carefully.

I told him that, of course, he would not understand it all, that the Pope himself could not do that; but that he would, at least, in the Gospels and in the Acts, learn a great deal of the history of the founders of the Catholic faith that he did not know; and then, turning to St. John xiv. to xvii., the last discourse and prayer of our Lord, I told him he would there read more of the actual words our Saviour spoke than perhaps he had ever heard. He would, I believe, have gone on all night; but I thought it best not to over-instruct, and turned down a few pages for his special consideration.

He took away with him five Gospels of S. John to distribute; so perhaps this most disagreeable visit may be productive of some good, though I may never hear of it in this world.

So passed Good Friday in Minas Geraes. At Rio de Janeiro the Emperor commuted the sentences of eighteen criminals.

April 12, Easter Even.—This afternoon I went after insects, but the weather was so windy and cold that I was not successful. In the evening was the “Procissão do Triunpho,” but as I was engaged dining with our chief I did not see it.

April 13, Easter Day.—This morning, at three, there was Mass at the church; the whole of my guests were present, the church was crowded, and the service was quiet,

reverent, and most refreshing. There were only two communicants—the good old father of John Baptist, to whom I am very much attached, and one other man. At 6 a.m. there was a procession, headed by a beautiful statue of our Lord, followed by the Host borne by Padre Antonio, the parish priest, in a white and gold cope, under a baldequin. In front of the procession went a boy ringing a bell, and every one in the street knelt as the Host passed. My guests were then, after a short sleep, all up, and making ready to depart. I had prepared my oxen and fatlings for a high breakfast; however, they would not wait for it, but insisted on my breakfasting with them. Then came all the horses and mules, and also a lot of their friends, male and female, who were to ride in the same direction, and I had to receive them and talk to them. Such a motley crowd you never saw; there was scarce standing room, even in my large apartment. Finally, after many embraces and congratulations, thanks, etc., a cavalcade of some thirty riders, attended by slaves and mules bearing luggage, departed from my mansion. And once more, at 9 a.m., I was left alone and in quietness.

On the whole, despite much inconvenience, the experience of the last few days is not unmixed with pleasant reminiscences, and I dare say I shall look back upon it with pleasure.

By way of emphasizing my note on a previous page, I may state that all my guests took an affectionate farewell of my Hebe, and called her "comadre."

I spent nearly the whole day with the chief engineer of the fourth section, who came in two days since with his left wrist broken by an accident, and his right arm disabled.

All the numerous visitors who came to the town for the festa—and they must have numbered about three

thousand—left in the course of Easter Sunday and Monday, when the cidade resumed its ordinary appearance.

April 17.—This evening on my way home I met four niggers carrying the body of a man in a shallow coffin only some six inches deep. He was dressed in a very good suit of clothes and a new pair of patent leather boots; his face was covered by a handkerchief. The niggers were laughing, as if going to a picnic.

After dinner, Joscelino's eldest boy brought me a large leaf, from the under side of which hung four of the most gorgeous chrysalides I ever saw. They were about the size of the pupæ of the Large White (*Pieris Brassicæ*), but appeared as if covered with plates of silver or burnished steel. On the morning of the 21st, four days later, while I was dressing, I saw the chrysalides changing colour and becoming dappled red, yellow, and brown. An hour later the butterflies all emerged, and turned out to be *Mechanitis polymnia*, which is very abundant here. All the brilliant lustre was then gone from the pupæ cases, which were transparent and colourless.

We have had another disturbance at the post-office, in consequence of our chief having written to Rio de Janeiro about certain irregularities, at which the authorities here, who go on the let-things-take-their-chance plan, are very irate. Several of the townsfolk are delighted, as they have long been inconvenienced by the carelessness that rules in this town; but being Conservatives, while the powers that be are Liberal, they were afraid of moving in the matter, as it would be put down to party spite.

I told you some time ago that Padre Pinto wished to see me about the railway, after having treated us with scant courtesy when I passed his fazenda several times. He is a poor miserable cripple, his left side being paralyzed,

so that he can hardly drag himself about, and the malady seems gradually extending to the other side. He is always in pain, has the most awfully cadaverous face, with sad eyes, which glare at you from cavernous orbits; he cannot sit still a moment, but twists and contorts his face with the most frightful grimaces, groans, and cries out, "Oh, my back; oh, my stomach, Santa Maria," etc. He has the greatest objection to the railway, saying it will entirely destroy his pig-breeding (*criação de porcos*). I tried to reason the matter out with him, but he would not be convinced, and insisted that the railway must be moved to the other side of the valley, which is, he says, much the better situation for it. As a matter of fact, however, that would be the *most* inconvenient route imaginable. However, I said I would see what could be done about altering the position of the line somewhat. I also spoke about the matter to the fiscal engineer, who has lately been here again. On Sunday I visited Padre Pinto, and told him that I had done all I could, and had arranged with the fiscal engineer to see what alterations could be made in construction, in case of my not being here. The poor padre was greatly affected, and wept, and on my leaving sent over his nephew with two bottles of vinho virgem for me. He now wishes me to go in every day once or twice to take coffee, and is becoming quite a nuisance by his well-meant kindness.

April 20.—This evening all the remaining members of the staff came up to my house, and Bithell stayed on after the others were gone. About midnight we heard a party of serenaders outside; they have been about for the last two or three evenings, and last night the fiscal engineer was with them. To-night their party included the Public Prosecutor and two or three others. They came

in here and played and sang to the guitar till nearly 1 a.m.; so I had enough of them. They exhausted my store of liquor.

The appearance of the sky on a moonless night is so different here to what it is in the northern hemisphere; the stars are very sparsely scattered about, in comparison. The principal constellations are in the neighbourhood of the Milky Way, and that is thinner than ours. In the midst of it is the Southern Cross, near which, to the south-east, is a remarkable blackness that is incomprehensible to me. I admire the Magellanic Clouds very much, and should like to see them through a telescope. There is also the beautiful α and β Centauri, and a little way off Canopus of Argo-navis, second only in brightness to the Dogstar himself.

May 4.—"Mez de Maria," the month of Mary, has begun, and now every evening there is a service in the church in honour of Our Lady. Several friends have told me I ought to go and see it, but I have not been yet. To-day, however, being Sunday, I went to church in the morning, and was appalled at the sight that met my eyes. The altar was all covered with white, all the various ornaments and images were removed from the lofty retable, which was also draped with white, and at the top was a tall statue of the Virgin entirely in white, with a wreath of fresh flowers on her head. I hear that at the daily evening service this wreath is renewed by a little girl. Round the figure's waist is a broad blue ribbon, which hangs down over the altar, and this ribbon was devoutly kissed by many on leaving the church. After the Gospel, Padre Antonio preached a good little sermon on purity; but at the close of the service was sung the Litany of the Blessed Virgin Mary, and other prayers to her.

May 7.—Yesterday, after nearly four months' close office work, when my daily walk has been up and down the village twice a day, I went out with Large prospecting on horseback, and the work was very interesting. The scheme of our railway is to start from the head waters of the Rio Paraopeba, and, following the shortest route by way of its several tributary streams, to reach the head waters of the Rio Para. In doing this we cross four divides: the first two are between Paraopeba station and Brumado, one near São Caetano, the other at the Serra do Cortume already described; the other two are on the second section, the first of which separates the Rio da Cachoeira from the Rio Cayuába, and the second is the division between the waters of the tributaries of the rivers Paraopeba and Para. All these divides are from 3000 feet to 3200 feet above sea level. The location of the line between this town and the Cayuába needed some alteration, and so we had to look it up. Oh, what a relief it was after four months of office work to get on horseback and canter over downs, or even crawl along tracks through a dense forest! But I also had the delight of seeing some new insects, besides the tantalization of being obliged to pass them by uncaptured. One splendid opalesque white *Morpho* (*M. Laertes*) flew across our path.

From the observations we made I plotted an improved line of sections to-day, which appeared most satisfactory.

One change which has resulted from my thus having to go out, though only for a few days, is what I have long desired. For some time I have been nauseated by my hideous black cook and her extreme filth. I cannot weary you with details; one item will suffice. Imagine going into the kitchen for some trifle or other, and seeing your cook preparing your dinner, and whiling away the spare moments

by "picking them out" of her daughter's head!—this said daughter, who is my laundress, at the same time performing a like grateful operation on one of her brothers. The next moment my grisly old horror will be peeling my potatoes or washing my rice.

Making the excuse of being out all day, I have, therefore, now arranged to take my meals with Large at the hotel, and the black sinner comes every evening after my return to bring water, and twice a week to sweep out the house. I am, therefore, now relieved of the presence of this siren and her half-clothed brats.

I received to-day your seven newspapers. Of course, I have not had time to look at any of them, except the one with a full account of the Duke of Albany's funeral. The first news I had of this sad event was a telegram in the *Journal de Commercio*, of Rio de Janeiro, of March 31, which reached us on April 3: "The Duke of Albany died at Cannes from an accident." I was appalled, and could hardly believe it. How I do pity the poor Queen, but especially the Duchess! I lay awake for a long time the night after I read the news, thinking of them. But I know this will be an occasion on which the widely spread sympathy to others from our Queen's motherly heart will strike a responsive chord among millions, not only of her subjects, but throughout the whole world. I am sure, for one, that the old schoolmaster at Casa Grande would grieve if he knew of the "Lady Victoria's" fresh sorrow.

May 12.—We have now finished the outdoor part of this extra work. Our route lay for about two miles along a valley belonging to John Baptist, to which I have before referred. This was the chief part of the cultivated ground on the length we have just surveyed. Here the niggers were very busy, on both sides of the valley, plucking off the

milho and putting it into ox-carts to be carried into the town. I saw these niggers at breakfast round a large iron pot containing "angu," which is a kind of porridge made of maize-meal,* or fuba.

I met John Baptist one morning early, on horseback, in his plantations; he was muffled up in a large shawl, as is usual here during the cold penetrating mists of early morn, though the days are generally now cloudless and grand.

He has two farms in this valley, besides a fine bath where he and his family come often to bathe. We came across numbers of his cows and calves, and put up for breakfast in one or other of his ranchos. He has lately imported some machinery from France for making butter. The process was explained to me the other day by his dumb son. We also tasted some of the butter—his first trial—and it was delicious; in fact, perfect.†

The last time I was in the milho fields I wrote to you of their luxuriant green stems and foliage—that was in January; now all is brown and withered, and the corn is fully ripe. In these plantations there is a vast undergrowth of the cotton plant with its lovely yellow flowers, and the castor-oil plant ripe and ready for picking. Of the latter I have eaten a few beans, which are prettily striped black and white, and are not bad to the taste. There are also black and white beans now ripe, the plants resembling French beans. Any amount of gourds of all shapes and sizes are mingled with the other plants; they, too, are ripe

* By the kindness of our chief, a Scotchman, who gave me some Scotch oatmeal, I frequently had porridge for breakfast. Oatmeal is unknown here. I called it "angú de avea" (oats); and after the first lesson my old woman prepared it to perfection.

† Before I left Rio de Janeiro I heard that he was sending butter to that city, where it found a ready market, and was all ordered before it arrived, so I could not buy any of it.

and ready for making into the calabashes which are so universally used. The cotton plants I mention are a second crop, as the first crop is picked, and the snow-white down is now being spun in every hut in the town.

Amongst butterflies I saw many *Papilios*, besides the pretty green *Colænis Dido*, which I have seen commonly even in the streets of Rio de Janeiro—and several *Hesperiæ*, etc., also many birds. The valley of the Cayuába is covered with dense jungle; the stream is only some six feet wide, very tortuous, and bordered by masses of bamboos; while many trunks fallen across the stream form fine natural bridges for crossing through a paradise of moss, maidenhair, tree-ferns, and other beautiful plants, trees, and shrubs. In this valley I was able to capture four fine specimens of a butterfly, *Callicore Eluina*, which Hewitson describes as the most lovely species of that enchanting genus.

Carrapatos were beginning to appear with the cessation of the rains, and the bushes in some parts were covered by myriads of little creatures just hatched. They are very small, similar to harvest-bugs, and as irritating; for of course, as usual, they attacked me fearfully. The men called them "carrapatinhos miudinhos zinhos," or sort of minute carrapatos.

It is now definitely arranged that we all leave this place for Rio de Janeiro on the 27th, the chief having gone down on the 11th, and we are looking forward with the greatest pleasure to exchanging the vegetating in a small village for life in the capital. You may imagine how tired we are, after some four months and a half of a very monotonous existence, which may be summed up as follows: walking up the village to the office at 8 or 8.30, returning

at 5 or 5.30, having been home for breakfast about mid-day; invariably seeing the one-eyed Francisco sitting on his doorstep, eternally nursing one of his half-dozen cats or kittens, and occasionally talking to one or more neighbours; generally passing Padre Pinto on his balcony, who always asks me to go in and have coffee, which I am compelled to do periodically, so as not to affront the poor old man, and his one topic of conversation is the "*criação de porcos*," or breeding of pigs; continually meeting the same familiar faces, making the same everlasting bows, and saying the same words. Then, on Sunday I am expected every week to make a round of visits, and John Baptist feels affronted if I don't go there, generally to dinner, which, being at 3 p.m., spoils my appetite for my own dinner at 6.30, and I cannot get anything to eat later in the evening. In the morning the cold, with a penetrating mist, is so great I don't care to go out early, even if I have the energy, and the sun setting shortly after we leave the office, one cannot walk then; besides which, weary with the daily work, one is glad to rest till dinner is ready, and the evening is spent either in writing, reading, or talking with some of the various members of the staff, or all of them, who drop in. Occasionally we vary the monotony with some pleasing game, using coffee berries or maize for counters. Such a life is little more than vegetating.

Another reason for wishing to get away is the cold, early and late. The thermometer for some five or six consecutive nights has been below freezing point, sometimes five or six degrees. To-day, though cloudless sunshine, there were cold southerly breezes, and every one was going about in heavy greatcoats, with their heads buried in their collars. They wondered at me, a northerner, for

feeling the cold ; but I explained that although in England it was often much colder in November, answering to May here, yet the days were also cold, and so one becomes accustomed to it, never having in our climate a grilling tropical sun with cloudless sky in winter, and the other extreme of cold at night, with a difference of some 80° Fahr. in the temperature of midday and midnight. To-night, after dinner, sitting in my large bare mud-floored, mud-walled room, my hands and feet were cold as ice, and at 6.30 p.m. the thermometer in the garden stood at 37°, with a cold air ; in the room it was 50°. How I long for a good red fire to sit beside and place my feet near !

I have read with great interest Mr. Hammond's letter in the *Times* of the 19th of April on Brazilian railways. He certainly takes a pessimist view, and appears to have some private grievance, for "toute verité n'est pas bonne a dire ;" at least, in such an abrupt manner.

Being Ascension Day, I did not do much at the office, but went to Mass, and watched the people for the last time here. The women and girls all begin to flock to church long before the hour of service, and soon fill up the nave, while the men only go in at the last moment. There is always a continuous stream of the gentler sex past my door—fine young negresses, with brilliant handkerchiefs round their heads, dressed in bright yellow, red, blue, or green, print or muslin, gowns ; some of them have shawls also of vividly contrasting hues. Nearly all the white or whitish girls and women wear nothing on their heads, but their well-oiled shiny black tresses are neatly plaited and coiled up, and decked with flowers. Some of the richer matrons wear picturesque black-lace mantillas, and a few girls come out in the latest Paris fashions, with jaunty little

hats, ribbons, and feathers, and high-heeled boots. A brief sentence will be enough to speak of the men. The slaves and poorer classes dress in a variety of materials—sackcloth, cotton, and wool. The gentry generally in black frock-coats, white trousers, and black ties, with soft black felt or round “pot” hats. I have never seen a silk hat worn here.

May 26.—The great labour of packing up is concluded. We had arranged for two ox-carts to come at nine this morning; they did not arrive till 11.30. The work of packing them was no trifle, as, owing to their having first been to the office, much of the luggage had to be taken out and rearranged. The natives do not understand that it is advisable to have all the heavy luggage at the bottom of the carts, not only to prevent crushing up lighter baggage, but also to prevent the vehicles overturning when, on these admirable roads, one side is a yard or so higher than the other.

Having sent off everything except what we were to take with us, we, in a body, paid a round of farewell visits. I always dislike saying “good-bye,” and in this case did not disguise the feeling I had that it might be for a lengthened period; indeed, as far as I was concerned, perhaps final. Poor Padre Pinto actually shed tears.

At 6 p.m. I saw a magnificent atmospheric effect. There was a superb after-glow, and in the midst of the crimson light was the new moon, with the faintest crescent of shining white, whilst the refraction from the earth revealed the whole of the moon’s surface in a dark green tint.

May 27.—Up at 5 a.m. Thermometer 37° outside; coldest during the night 31°. Very damp and cold; of course, pitch dark. By six there was a heavy, penetrating,

chilling mist. After coffee, etc., I had to take a final leave of some friends, give away some old clothes, say adieu to my hideous old cook and some half-dozen of her family mustered for the occasion, pack up my blankets, etc., and was at the office by seven.

I may here mention *re* blankets, that during the whole time I was in camp, and also during my sojourn at Brumado, I always slept in flannels and between the blankets only, the sole article of cotton in my bed being my pillow-case. During my camp-life I always worked in a flannel shirt, and also went for my Saturday afternoon explorations near Brumado clothed in the same fashion, though while working at the office I wore cotton shirts—*never* linen. This means of procedure is most important in order to avoid the chills of the early morning and the evening; and it is very probable that had I always worn a flannel shirt, I should not have had the severe cough and touch of bronchitis I suffered from a short time ago.*

Arrived at the office, there were further delays. One of the two "medicos" of the town was there bargaining about certain things we wished to dispose of, and so it was 8.30 before the words were given, "To the saddle." We were five in number, having two servants to accompany us to Queluz, and one pack-mule. I wore my native heavy poncho, a sort of blue rough cloth, lined with scarlet. My horse was a good one, and, having done no work for several days, was tolerably fresh. After putting my left

* On visiting the Health Exhibition after my return to England, I specially examined Dr. Jaeger's health clothing. His theory is that animal substances alone should be worn next the skin. In that exhibition he showed even cashmere sheets and pillow-cases and woollen bands for placing inside hats. My testimony was written months before I heard of Dr. Jaeger. I may also mention the case of my brother in North-west Iowa, who works in flannel throughout the summer heat on his farm, with the greatest physical exertion, such as pitching hay on to the ricks.

foot in the stirrup, and seizing his mane, I threw back my poncho to enable me to jump into the saddle. I suppose he was frightened thereat; anyhow, he started off at a gallop up the street through the freezing mist. My helmet flew off, the cold air blinded my eyes with tears, and I went tearing up towards the church, endeavouring to get my other leg over. When this was done, I pulled him up and turned him back, after going some three hundred yards, thinking I should kill any number of children, who, with their parents, were all out to see our departure, and rejoined our party, who were splitting their sides with laughing at my discomfort. One of our men had jumped into the saddle and ridden after me, but only caught me up as I was returning. I took it out of that horse during the day, galloping on in front and waiting for the others to come up, and before we had finished our ride I had to spur him to get on.

Leaving Brumado at 8.30, we reached Suassuhy at 11.15. For the first part of this ride the mist hid everything, and we passed through uncultivated land, which was only remarkable for the cañons, or "barrancadas," which I have mentioned on going over the same ground nearly eleven months before. Owing to one more wet season they were much enlarged, and in some cases the path was really dangerous, having subsided a yard or two. The mist, however, as usual, rolled off as if by magic, and for a time I luxuriated in the cloudless sky and fine views of the valleys, and the ranges of Boa Morte and Ouro Branco. We reached the bridge over the Rio Paraopeba at 12.30, rested here an hour for breakfast, which we had brought with us, and then rode across country through forest and capoeira and scrub, with occasionally some cultivated land, to the station of Lafayette (Queluz), where we arrived

by easy stages at 4.45. About half-way, in a charming little dell, we met the postman carrying the mails to Brumado.

I should say the whole distance is about twenty-six or twenty-eight miles.

There are great changes in this place since I was here on July 1, last year. The town of Queluz is up on a hill; the station Lafayette (so named, as also the next two stations down the line—Buarque Macedo and Christiano Ottoni—from celebrated statesmen), which last July was in course of construction, and an isolated building, is now the centre of a large colony of houses, inns, "armazems," *i.e.* stores of "seccos e molhados" (lit. dry goods and moist goods), etc. The principal building is the hotel we put up at, kept by the brothers Martinelli, who likewise own the hotel at Carandahy, of which they state, "N'esto vasto estabelecimento," etc., "In this vast establishment you can get," so on and so forth. This hotel has only lately been opened (since March), and is really replete with every comfort—furnished with an abundance of Austrian bent-wood furniture, and even flat candlesticks with circular glass shades!

May 28.—Went and had a long talk with Mr. Hargreaves about our railway, the construction of the Ouro Preto line, and prolongation of Dom Pedro II., etc. He received us most amiably, and was very kind. We also went to visit an Italian and an Austrian, Fenili and Negri by name, who had been to Brumado a short time since to apply for work as sub-contractors on the construction of our line.

May 29.—We rose at 3.45, had coffee, and our train slowly steamed out of the station at 5.5, a long loud steam whistle having sounded an hour previously to waken

passengers. Reaching Paraopeba Station about sunrise, the mists were just beginning to gather, but by nine they were entirely dispersed.

The Parahybúna valley looked magnificent—its lofty sides covered with coffee plantations, and the wide, tortuous river rushing over its rocky bed strewn with countless boulders, or boiling and seething in its headlong course over numerous rapids. These beauties reach their climax at the huge perpendicular precipice named Pedra da Fortaleza (the stone of the stronghold or fortress), which is some five hundred feet high—a bare face of rock, on the top of which is a forest, the trees looking like bilberry bushes owing to the height. This rock is close to the station of Parahybúna, and is the boundary between the provinces of Minas Geraes and Rio de Janeiro. It was the scene of a great battle when the Mineiros were struggling for their independence, the passage along the banks of the Parahybúna river being one of the most accessible entrances from the province of Rio de Janeiro. The Parahybúna, flowing south, empties itself into the Parahyba do Sul, flowing east, and the latter enters the Atlantic some 150 miles east of the junction.* Descending the Parahybúna valley for a long distance, after passing Entre Rios, the railway ascends the valley of the Parahyba as far as the Barra (junction) do Pirahy, where there is a junction not only of rivers, but of railways. (See map.) This part of the Parahyba valley is much wider though

* Parahybúna appears to be a "corruption of *Parayuna*, 'a river rolling black waves'—at once a picturesque and remarkably correct description." Parahyba do Sul is so called to distinguish it from the province of the same name north of Pernambuco. The derivation of the name from *Para*, a river, and *Ayba*, bad, "would be an excellent descriptive name. It is one of the most dangerous streams in Brazil. Many of those working on the railway lost their lives in it."—Captain Burton.

less grand than the Parahybúna, but a dozen picturesque and lovely views meet the eye at every curve in the road. The hours occupied in passing through these two valleys are the most enjoyable of the whole journey. The view, at sunset, just before the last great zigzag—when we are rapidly descending from the mountains to the plain, and see our track a thousand feet below in some places—was even finer than the last time I went down ; then the darkness soon hid everything from our sight. At length the lights of the outskirts of Rio de Janeiro are seen, and at 7.12, after over fourteen hours of the train, we reach the station, are met by our chief and a friend, and presently whisked off to Carson's Hotel.

CHAPTER IX.

OUR LIFE AT RIO DE JANEIRO.

Carson's Hotel.

May 30, 1884.—This hotel is so full that, to avoid being at the top of the house, I have taken possession of the only garden room which is unoccupied. This annexe consists of a row of a dozen rooms running back from the hotel at right angles and at the side of the garden. In front of them is a verandah, which keeps off both heat and rain—and I much prefer these rooms to those in the hotel, for they are so quiet—and, opening on to the garden, the eye rests on a large well-kept green plot formed of a kind of knot-grass (*spergula*), which here takes the place of turf. This plot is surrounded by lofty palms, while the garden is replete with fan and other palms, cycads, orchids, plantains, dracæna, crotons, and other richly variegated plants. Beyond these is a regular English kitchen garden, and behind all rises the lofty hill Morro da Nova Cintra (813 ft.), dotted half-way up with houses.

Before breakfast I walked down a fine street opposite the hotel to the embankment, or Praia do Flamengo, which skirts the bay. On one side of the broad road is a low wall washed by the water; on the other, a row of lofty houses, gay, picturesque, and bright—as are all the newer

houses in Rio—with artistic stucco ornament and *bas reliefs* picked out with endless tints of blue, red, yellow, and green. This embankment extends over half a mile, and is bounded on the left by the Morro da Gloria, on the right by the Morro da Viuva, beyond which latter is the entrance to the Bay of Botafogo. It is these rounded “morros,” or hills, covered with houses and a church or two, which, rising from the level ground and jutting out into the bay, form one of the most picturesque features in the city of Rio de Janeiro.

The view was quite Turneresque. Overhead, a cloudless sky and warm sun, while over the bay hung a mist, through which the town and hills of Nichteroy were just visible, though in some parts more distinct than in others; and on our side of the bay, the summit of the Sugar-loaf rose high above the mist that surrounded its base, and stood out in grand relief against the blue sky.

After breakfast we went into the town on business, and in the afternoon, having had two boarding-houses recommended to us, we took the tramcar to Botafogo and inspected one of them, from thence walking to Lorangeiras to see the other.

The house at Lorangeiras appeared much more shut in than that at Botafogo, so the next morning Mr. Large and I, with another member of our staff, walked up to Botafogo, and engaged rooms in the first house we had seen. We then strolled back by the hospital (Misericordia), which is a very imposing building, with a large circular white dome that is quite a landmark. This hospital, with the schools of health, anatomy, and various other buildings, form a really fine group, worthy of the capital of Brazil. Walking thence to the ferry, we went across the bay to Nichteroy. This town appears to stand in somewhat the same relation-

ship to Rio de Janeiro * that Birkenhead does to Liverpool, and is equally dead. The heat there, though nearly mid-winter, felt very much more excessive than at Rio ; but I am told that, as a rule, this is not so. After rambling about Nichteroy, we came to Porto da Areia, one of the three pretty bays that are grouped close together on that side. Here there is a shipbuilding and repairing yard, but our attention was especially drawn to a skiff in the bay, anchored a little way off from the shore, the only inmates of which appeared to be a large monkey chained to the stern, who perpetually moved to and fro, as if fretting at his confinement, and three small monkeys, which were scampering up the rigging and over the decks, and anon running along the jibboom, enjoying themselves in the grilling sunshine. We had some slight refreshment at a small cabaret, where the fruit and Rio beer were alike good and cheap.

The view of the town of Rio from Nichteroy, where we sat awaiting our return ferry-boat, was very lovely : the Corcovado and fantastic outline of the mountain chain formed the background ; below lay the town with its many hills ; then the Sugar-loaf beyond which rolled the Atlantic, the ports, islands, a multitude of shipping, and a wide belt of the deep blue bay ; while in the foreground, on each side of us, were the house-clad crescent arms of this small bay ;—the whole forming a beautiful picture, under an almost

* The capital is generally known by the name of Rio de Janeiro, but its real name is São Sebastião do Rio de Janeiro. The discoverers entered the bay in the month of January, and, before exploring it, deemed it to be the mouth of a river, which they named Rio de Janeiro (January), and on building the town called it after St. Sebastian. Of course, the bay is a bay and nothing else, though of such a vast extent that it is large enough to hold all the fleets of the world. It contains some three hundred islands, one of them, the Ilha do Governador, about twenty-four miles long.

painfully clear sky, which once seen must long remain imprinted in the mind's eye.

Rua Farani 12, Botafogo.

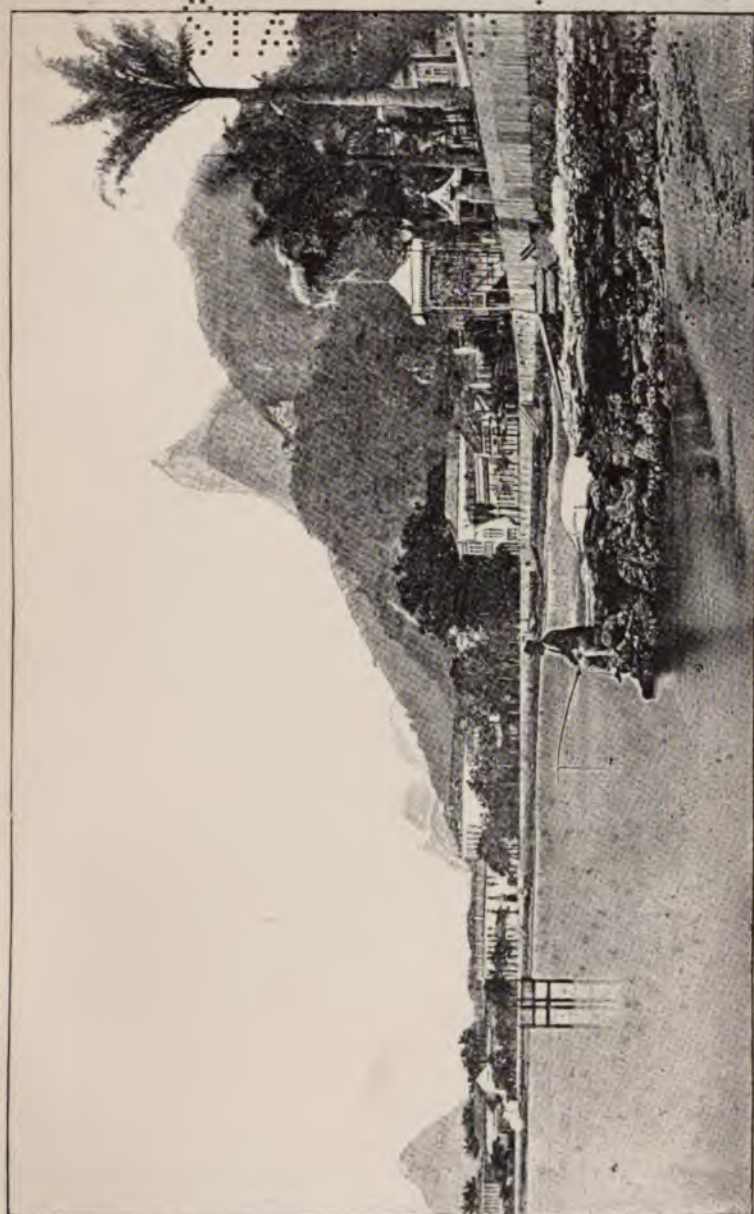
June 2.—We moved up here to-day, and I am really delighted with the house. It is at the end of a street, some three hundred yards long, placed at right angles to the Bay of Botafogo,* and is on the side of a hill, Morro da Boa Vista (485 feet), one of the ridges of the Corcovado. This house used to be an hotel,† is of one story, and approached from the street by three flights of steps. There are two terraces on each side of the building, with gardens and fountains on each terrace, orange trees and kitchen gardens on the lower, huge palm trees and exotic shrubs and flowers on the higher, which is on the same level as the house. On the latter are also grottos and seats of the true Pompeian fashion; while above them and behind the house rises the hill, covered with glorious virgin forest, wherein pretty marmosets play about, and the garden is always full of lovely butterflies, some of which (*Ageronia Feronia*) have a marvellous protective colouring, which one would not dream of until one sees them raising and flattening their wings in the sunshine on the huge lichen-covered trunks of the grand palm trees. In front of the house are two immense mango trees, their branches one mass of lichens, especially one hanging species (*Ramalina implecta*), sometimes two or three feet long, of a green-grey colour. It is a curious fact that though the mango trees are so plentiful and of an excessively large growth in Rio de Janeiro, they produce very little fruit.

* The word means "thrown into the fire," and alludes to the fearful *autos da fé*, when the poor natives, on refusing to be converted to the Roman Catholic religion, were committed by the priests to the flames.

† It is now (January, 1886) once more an hotel.

Now a word about the house. On entering we find ourselves in a gallery, some seventy feet long by twenty wide and fourteen high, with a bedroom at each end. The drawing-room is a fine apartment out of the gallery, with no light except from the six external windows of the said gallery, so it is always cool. On each side of it are passages, off which are several good bedrooms, bathroom with shower bath, etc. On the right side is a wing containing more bedrooms, a splendid dining-room, some seventy feet by thirty, opening on to a lovely garden, and also the apartments of the owners of the mansion. The house is certainly most comfortable and airy, and has everything needful for the greatest luxury and personal ease, which is so important in this climate.

After dinner I went down the street and sat on the low wall which surrounds this part of the bay. The view was enchanting. From this point the bay appears to be a lake, as the Morro da Viuva seems to touch the base of the Sugar-loaf; whereas these hills, the one about 200 feet and the other 1283 feet, are the sentries at the entrance, which is half a mile wide. The vast pyramid of the Sugar-loaf stands out magnificently; to the right appear the white outlines of the Military College and the Lunatic Asylum; the row of star-like gas-lamps, extending three-quarters of a circle, were reflected in the scarcely rippled waters, and I watched the fishermen at their work. With bare feet, a large stone on their heads, and a net gathered up in their left hand, they waded up to their waist, and, when they see a likely spot, throw the stone a dozen feet in front, following it up by skilfully casting their net so as to enclose as large an area as possible, and on drawing the net in they generally catch, at least, one good fish. This process they repeat with great perseverance, sometimes in vain, until



BAY OF EOTAFOGO, WITH THE CORCOVADO.

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they have a tolerable supply of the finny inhabitants of the bay, who are incautious enough to come close in to shore ; and while I watched them I was surprised at their success. There are, of course, many others who fish from boats in the bay, and also go outside on the Atlantic ; but they are an independent set of men, very different to our own toiling fishermen,* and sometimes the supply of fish runs short in the town because the men have not gone out, owing to bad weather.

Speaking of fish reminds me that I must mention the pedlars, whose name is legion. Some of them sell fish and prawns—"Peixe!" (fish) and "Camarões!" (prawns) are two of the most frequent street-cries—others have fruit and vegetables. These pedlars always carry a long bamboo over their shoulder, from each end of which is suspended a full basket, and the weight of the vegetables is often so great that it is a wonder how the bearer can trudge along as quickly as he does. There are also hawkers of stuffs, articles of clothing, ornaments, etc., which are generally contained in a series of gaily painted tin trunks, strapped on the hawker's back. These all carry two pieces of wood fastened together by a leathern strap, and, as they walk along, they are continuously clapped together. Many of the fish pedlars are Chinamen, the remains of a batch of some hundreds who were imported several years ago ; they have abandoned the pigtail and Eastern dress, and wear their straight black hair very unkempt, with the ordinary dress of Western civilization.

The yellow fever is now quite gone for the winter, though this summer, in February, it was very bad ; there

* Since my return I have read some most interesting details of the hardships borne by the fishers on the North Sea, in Mr. R. M. Ballantyne's very pleasant work, "The Young Trawler."

have been no cases now for some time. Far more people die of "molestias pulmonares" (chest diseases) in Rio than of yellow fever. This is easily ascertained, as it is the custom in the papers to insert always the cause of death in the notices of the fact. The weather is delightful, and I luxuriate in the warmth of the evenings after the cold of Minas; but I think the chief fault that I have to find with the tropics is the absence of twilight and the early hour of sunset. The following is a table of sunrise and sunset in Rio de Janeiro, which may be of interest:—

		Sunrise.	Sunset.			Sunrise.	Sunset.
		a.m.	p.m.			a.m.	p.m.
Jan.	1	5.19	6.41	July	1	6.42	5.18
"	15	5.22	6.38	"	15	6.39	5.21
Feb.	1	5.33	6.29	Aug.	1	6.31	5.29
"	15	5.38	6.22	"	15	6.24	5.36
March	1	5.47	6.13	Sept.	1	6.14	5.46
"	15	5.56	6.4	"	15	6.6	5.54
April	1	6.7	5.52	Oct.	1	5.55	6.5
"	15	6.15	5.44	"	15	5.45	6.15
May	1	6.26	5.33	Nov.	1	5.34	6.19
"	15	6.33	5.27	"	15	5.27	6.29
June	1	6.39	5.21	Dec.	1	5.21	6.39
"	15	6.42	5.18	"	15	5.18	6.42

This evening we heard the important political news of the fall of the present (Republican) Ministry of Lafayette. They have grossly mismanaged their home affairs, and have been tottering for some time. I believe the last straw which drove them out was their illegal act of the confiscation of all the convent property, valued at about £2,000,000. More than ten years ago there was a law passed to enable the Government, within ten years, to take over all the convent property, allowing the present members, owners, etc., apolices and their full incomes for their lives, after which the whole was to revert to the Government. This law was a dead letter, and had fallen through. Suddenly,

some four months since, the Government, not knowing where to turn for money, determined to sequester this property. One of the ministers issued a Commission, the members of which went round the next morning to about a hundred and eighty houses belonging to certain convents in Rio. These houses are let to various people, natives and foreigners; and one of the tenants, a Scotchman, told me the history. The Commission visited his house, and ordered him to pay the rent for the month then due, and all rent in future to the Government, and not to the "fratres." He refused to do this, but was given a day or two to decide. His lawyer said the proceedings were quite illegal, and he then assembled a few others—Brazilians, Portuguese, and Germans—who were placed in the same position. They determined not to be in a hurry. But meanwhile the convent folk had procured an order from one of the judges, and directed all their tenants to pay the rents to *them* on pain of having the bailiffs put in; and the Government Commission had said, "Pay up to us within twenty-four hours, or we will send in soldiers to take possession." The tenants then went to the judges, presented their grievance, and asked for a power to pay their rents into the Treasury in their own names, but, as the property of those to whom they might be adjudged, leaving the money there till the affair was settled. This was granted, and the money deposited. Then came the fight. The Commission said that the judges were wrong and incompetent; the judges and lawyers, that the act of the Government was illegal and unconstitutional. A test case was tried, and the judges gave sentence *for* the convents; and yet, after this, the minister went to the Treasury and carried off all the rents which had been placed there, and that had been declared in court to belong to the religious orders.

This is but a brief account of a very serious business; but this matter and a public assassination which was permitted by the Government will show you the rotten state of things here.

The public assassination took place last January, and the facts of it are as follows:—The editor of one of the papers here had published certain remarks against some officers in the army, and, hearing that they proposed his assassination, he went to the chief of police and claimed his protection. This gentleman harboured him for some hours, and then said that as the coast was clear he could return home. This he was very loth to do; but the Chief of Police brought round a carriage, put him in, and sent him off. He had only driven a few yards when the carriage was surrounded and stopped, the unfortunate editor was stabbed to the heart, and dragged out of the carriage by a band of men in plain clothes (officers of the —), who then discharged their revolvers into his corpse, threw the body into the doorway of the Police Station, and walked quietly off. The affair was well known to have been preconcerted, all the police having been sent off to distant parts of the city to allow the murder to be accomplished. There was a great disturbance in the town, and crowds went to the house where the Ministers were then sitting in council. They escaped by back doors, and some are reported to have gone on board various ships in the bay. All the officers of that regiment, who were concerned in the deed, were despatched shortly to various remote places. These officers owe one firm alone some £8000, and there is no chance of their ever receiving the money.*

* The *Rio News*, January 24, 1884, commenting on this assassination, says, "The punishment of a criminal who has any influence whatever is becoming one of the forgotten things."


It is considered a disgrace to belong to the army in Brazil, which shows in what regard it is held; but, I believe, the navy is in a somewhat better condition.

June 7.—The Emperor having invited one well-known and good man to form a Cabinet, he refused; and then Senhor Dantas was summoned, who at last was able yesterday to select a Ministry of Liberals. They are all unknown men, but I hope may succeed; however, I am informed the only choice is in degree of corruption. The Emperor was urged to dissolve Parliament, but there is a great pressure of work which must be dealt with, and a new Parliament could not assemble for two or three months, probably more; so his Majesty would not consent to this step. The late Ministry was thrown out on a vote of confidence. They had a majority of two; but as four ministers voted, it was really a minority of two, so they had to give in.

Our office is nearly four miles from here, and I sometimes walk there and back, which I could not have done at Brumado, even with the mountain air. So much for good food and Guinness's stout, which I get here in perfection at six hundred reis (a shilling), for a small bottle.

The insects of Minas were loth to leave me, so I brought down two jiggers under the sole of my left foot, which I did not discover for some days. Here I have the delight of mosquitos, which torment me "some," as the Yankees say.

The captain of a sailing-vessel, which has just put into Rio for repairs, on her homeward journey with a cargo of nitrates from Antofagasta, came up the other evening to visit one of our fellow-boarders. He had lately heard of the Pitcairn Islanders, whom he visited some years ago. John Adam's descendants have all died out, but Christiansen's



remain. The population numbers seventy-six; and they all intermarry, with the result that every year insanity increases on the island.

I was told last night of the proposal to construct a railway tunnel under the bay from this city to Nichteroy. Mr. Barlow, of Westminster, is the engineer. It is proposed to lay some two miles of iron tubes in the silt of the bay, at a cost of £2,000,000. The scheme is well thought of, especially as water-pipes could be laid through the tunnel, and Nichteroy much needs a supply of good water. The gross annual receipts of the ferry are \$45,000, and the tunnel would afford through railway communication with Santos, opening up a rich coffee-growing country. The Government, however, would not guarantee the interest, as they do not consider it a necessity; but they have granted a concession for a long period.*

How I wish I could send home a case of Bahia oranges! But they would not stand the carriage. These oranges are about six inches in diameter, with thin skin, no pips, very luscious, and replete with juice; they are most refreshing. Talking of fruit, I may mention that, at least, in this expensive town, my luncheon is cheap, as I can obtain a tumbler of good rough red wine, a roll, and half a dozen bananas for sixpence.

I must now describe a bull-fight, which I witnessed with Mr. Large, on the 12th of June. The season began on Whitsun Day (June 1), and bull-fights are held every Sunday and on Holy Days. I was very anxious to see one, as they are one of the principal amusements here, besides, of course, the theatres. Though I had been told

* From news received at the end of October (1884), it appears the President of the Province of Rio de Janeiro has granted a guarantee of six per cent. on a capital of half a million to a company for supplying Nichteroy with water.

that the Brazilian bull-fights are very tame as compared with those in Spain, yet I was unprepared for such an utter fiasco as the affair turned out. Hearing that the ground was not far from our office, Mr. Large and I decided to walk there, and not take a tram; but, being misdirected, we lost some time in finding the locality. At last, however, we came to the place. The entrance was crowded, and a large banner was hung across the street, on which was the figure of a bull, with lowered head and swishing tail, and the words, "To-day, a fight of large and savage bulls." There was also a great display of bunting. We entered through a gateway under a house, and went into a field, where a wooden amphitheatre or circus was erected. There were two prices for the tickets—"sol" (sunshine), \$2, and "sombra" (shade), \$3. We selected the shade, and then nerved ourselves for the sanguinary scene by a bottle of excellent iced national beer, at only two and a half times the ordinary price. We arrived at 4.20, and the affair was to begin at 4.30, but the band was already playing.

On entering we found rows of wooden seats in tiers all round the circus, with a barrier half-way across, reaching to the inner ring. On one side of this barrier were the \$2 seats, on the other side the \$3. As half the \$2 seats were in the shade, we saw that we might have saved \$1 a-piece, which we much regretted not having done. In the middle of the \$2 seats was a platform, with a railed hole, surrounded by men with goads, who lifted up certain internal doors, and then opened others on to the arena to admit the savage (?) animals. This space, which was, of course, spread with sand, was surrounded by boards about breast high, outside which was a ring some four feet wide for the men to vault into when pursued.

Precisely at 4.30—and the only praiseworthy occurrence was this punctuality—some wooden gates near the bulls' entrance were opened, and a horseman appeared, announced by a great fanfare of trumpets, followed by eight torreadors in fantastic and picturesque dress, with purple cloaks. After advancing and bowing to two or three somebodies in the only private box, the gallant equestrian rode round the arena, facing the audience, which I should say numbered some five or six hundred men, women, and children, of all ages. After this, four of the torreadors vaulted into the outer ring, while the others remained with the horseman in the arena. The "cabalheiro" then retired, returning immediately on another horse. With a renewed flourish of trumpets the door was thrown open, and the *furious* bull came out. Walking quietly, he suddenly beheld the horse, and went for him, lowering his well-padded horns. But the horse did not like it, and, rearing, took a step back on his hind legs. The horseman was thrown, and immediately vaulted over the boards; then the four torreadors rushed after the horse, who was careering round and round, while the bull stood quietly in the midst gazing at the audience. The intrepid rider once more mounted, the bull repeated his charge, the horse rolled over with the man under him, and the bull jumped over them both. The man again vaulted into the ring, and the bull and the horse had a little game by themselves, racing at full speed round and round the arena. This amusement was ended by a torreador waving his faded purple cloak before the bull. The cabalheiro mounted for the third time, and rode away. So closed scene 1 of the first act.

Then came the playful dodge of placing the "bandeiras"—little sticks about a foot long, decorated with various coloured ribbons—into the bull's hump. A torre-

ador took a *bandeira* (barbed with a small and imperceptible dart) in each hand, and, holding his arms extended, brandished the sticks with their streaming ribbons before the bull, trying to induce him to advance. The orthodox plan is for the bull to make for the man, and when he lowers his head, the torreador should stick the two *bandeiras* into his hump and then turn nimbly aside to avoid being tossed. This dodge was more or less successful with bull No. 1—generally *less*. The bull knew the trick of old, and, though he was somewhat “game,” he was also wily, and would not always come up to the scratch. He did not, however, mind half a dozen barbs in his back, while some of the other bulls danced about, trying to throw off the darts.

Next came a little “cloak work”—waving the purple cloak in front of the bull, waiting his charge, and then, stepping on one side, letting the bull run against the cloak. Then the eight torreadors advanced, and one of them, rushing at the bull, jumped between his horns. The bull tossed his head up and down, but the man, being firmly wedged between the horns, could not be thrown off. The other seven men surrounded the animal, held his head down, twisted his tail round like the handle of a barrel-organ, and finally took the man off. The door then opened, two tame bullocks, with bells round their necks, came in, and bull No. 1 gracefully retired with his brethren.

Bull No. 2, a frisky white one, next entered. The dart dodge and cloak game went on for a spell; then the two tame “critturs” again appeared, and No. 2 made his exit as No. 1 had done.

Bull No. 3 followed. The same tricks were played on him as with the two former animals, with the addition that some of the *bandeiras* had crackers attached. The first

two of these were neatly stuck in, and the poor bull danced about in the midst of fire and smoke, accompanied by a terrific noise. The next two missed, and, beginning to explode, the man threw them down and mizzled into the ring. This he did three times, amidst the hisses of the spectators. This bull did not see the joke of the purple cloak, and backed from it instead of making for it. He soon went the way of the others.

Then came No. 4, who was black and frisky. When he appeared, all the torreadors vaulted into the ring, and the bull ran about for a season. Meanwhile three men from the audience, encouraged by the promise of a \$10 ticket each in a forthcoming lottery, volunteered to tackle him. Taking off their hats and coats, they entered the ring; and one of them went into the centre close behind the animal, who suddenly turned round on him. He had not presence of mind to swerve out of the way, but rushed helter-skelter across the arena, towards us, eyes nearly out of his head, terror on his face, bull after him, and, vaulting into the ring, sat panting and puffing amid roars of laughter. One of the other amateurs then tried to jump between the bull's horns, but did not get far enough. The bull put his head to the ground on the man's stomach, and desired to press the life out of him; but all the attendants rushed up and released him, when he also fled and vaulted over, pale and trembling. Renewed roars and screams of laughter resounded.

The third amateur tried the bandeira sticking, not wholly unsuccessfully, and was applauded. Bull No. 4 then retired.

No. 5 followed. The first six darts were well placed, then two crackers, after which four other darts. The cloak game was well manipulated with him; but the jumping on his horns proved a failure, and he withdrew.

No. 6 was a delusion. He would not do anything, and retired in disgrace.

No. 7 and last was very much the same as No. 6. So the tame bullocks led him away very soon, and thus ended the sanguinary contest with the "large and savage bulls." It was a regular fiasco, and though I laughed occasionally, it was not worth five shillings, except as an experience ; therefore, I shall be in no hurry to witness this spectacle again. I cannot see wherein the amusement consists, and was surprised to observe many well-dressed ladies among the company there assembled. According to the notices in the papers of the different bull-fights, it appears that the one I witnessed was an exceptionally good one ; so what must be the usual performance ?

I would far rather be one of these bulls, who do not suffer much pain—and generally one could see no blood coming from the dart-pricks—than a bullock in an ox-cart, working hard all day, a mass of sores from the brutal conduct of the drivers ; a heart-rending sight which I saw every day up country, when I was near a main road.

June 29.—This being S. Peter's Day is a great festival, and the principal amusement on these festas appears to be fireworks. It is quite obnoxious to walk or drive on these occasions, on account of the countless crackers and explosive little bombs which are thrown about ; I am surprised that the horses are not frightened, but they do not appear to be so. The air above is full of hissing rockets and fire-balloons, and one walks along expecting every moment to have a rocket-stick penetrate one's skull.

After church to-day, I ascended the Morro do Castello, about a quarter of an hour's walk. The view from the summit (275 feet above the sea) is enchanting, looking over the Ilha das Cobras (Isle of Snakes) to the Organ

Mountains on the north. Nichteroy, on the east side of the bay, looks quite close, and very picturesque with its background of steep undulating hills. At the foot of the morro are the brown-tiled roofs of the city, and from this vantage-point one can obtain some idea of its vast area ; endless towers, spires and domes of the different churches, break the monotony by rising above the roof level. The view, as I saw it to-day, towards the Organ Mountains is really sublime. A cloudless sky above, the scarcely rippled and glass-like bay beneath, dotted with ships and islands, and apparently extending in every direction. To the north, beyond the Ilha do Governador, the bay is bounded by ridges of misty mountains ; while towering far above them, and rising from a chain of fleecy white clouds, which extends in a broken line along the whole range, are seen the tremendous, fantastic, and jagged indigo peaks of the said Organ Mountains, some fifty or sixty miles off, which, though misty at their base and partly hidden by the stratum of cloud, stand out in bold relief against the bluish-white heat-laden sky.

It was simply perfection to sit and gaze on the lovely scene, with the sun's warm rays pouring down, and a soft breeze from the Atlantic lapping round one. I sat for half an hour enraptured, occasionally turning my eyes to the specks of people in the Praça Dom Pedro II. below (near the palace, the market, and the ferry), watching the Nichteroy ferry-boats gliding backwards and forwards, and hearing the endless crackers and rockets which are sent off by day as well as by night. Then I went round to the south side of the old battlements, which crown the top of the hill, to see the view towards the entrance of the bay. It is pretty, but nothing like the other lovely panorama. One sees the various morros scattered over the

newer and aristocratic part of the city, which is the south end going to Botafogo; the very picturesque hill called "Gloria;" the Corcovado, with its lofty forest-clad offshoots, like the arms of a star-fish or an octopus; the Sugar-loaf; and then the forts washed by the deep blue waters of the bay, and surrounded by a froth of breakers upon outlying rocks and a white foam from the waves rippling on the islands or peninsulas on which they are built; and beyond all these the boundless waters of the ocean. And as I gazed, the thought struck me that this water extends to the wavelets of the Thames, rippling upon the banks of Battersea Park and Cheyne Walk, within a mile of home. This led to reflections which you can imagine better than I can describe.

Reluctantly I at length bent my steps homeward to Botafogo, paying a little visit *en route* to my favourite Passeio Publico, and reaching our house at 2.15. After lunch I went with Mr. Large for a walk round the Bay of Botafogo. This is to my mind the most beautiful of all the house-surrounded bays. From the Morro da Viuva, wherein is a reservoir, there is a continuous line of houses bordering the wide road, which is paved with setts throughout, and has a double line of tram-rails. A low wall, as I have said, extends along the bay, bordering a path, at the edge of which is a row of shade-giving trees. On the other side of the road, on the path by the houses, are fine lofty palms and many other trees. The houses are all well built and picturesque, standing in well-kept gardens with fountains, and rich in many kinds of lovely tropical plants and flowers, besides roses, carnations, etc. These houses, among which are the large buildings named Hôtel d'Angleterre and Royal Hotel, extend some three-quarters of a mile round the bay, where the street with its tramway

turns off at right angles toward the Jardim Botânico. We continued our walk round the bay along a rough road, passing a huge morro, or hill, which is being extensively quarried for building stone. We examined in the sheds the dressed stone, a kind of grey granite, and admired the great skill with which it is chiselled into elaborate mouldings. We then reached a very fine building, the Hospício Pedro II. (the lunatic asylum), where three lunatics yelled at us through the barred windows, which look upon a well-kept garden surrounded by handsome wrought-iron railings. We next proceeded to the military school (Escola Militar), situated on a sandy spot between the Morro da Babylonia and the lofty hill which culminates in the Pão d'Assucar. On each side of the military school is a concrete wall, which prevented our reaching the Atlantic, that washes the shore beyond. Here we had fine views of the Organ Mountains through the entrance to the bay, and in the other direction, of the curious square-topped Gavea or Table Mountain beyond the Corcovado. Before returning, we conchologized for the first time, and picked up a few pretty shells on the sandy beach.

"In the gloaming" I sat alone in a Pompeian alcove on the upper terrace outside our house, and gazed on the warm colouring of the volcanic Sugar-loaf, seen through the rustling leaves of fan-palms, and between the trunks of the lofty Oreodoxa palms, revelling in the balmy breeze, listening to the rippling of the wavelets on the beach, thrilled with the beauty of the scene and the remembrance of such a day's experiences. One day like this would be almost worth while coming out for.

July 2.—I must mention the corruption and bribery that obtains in all the Government offices, and the ex-

orbitant duties and warehouse dues charged by the alfandega or custom house. It is a suicidal policy ; in fact, as my informant remarked, it is "the system of a miserable weak set of people, who want ready money at any price, without thinking of to-morrow." It is opportune here to remark that Exchange is now very low, 19½*d.* per milreis (par value being 27*d.*), which means, that as I leave by the *Valparaiso*, P.S.N.C., on the 26th inst., and shall therefore have to convert my money, I shall lose about ten per cent. I find it is the pleasing custom in this beautiful but insolvent country to lower Exchange at the time of paying dividends, in order, I suppose, to recoup themselves a little for the same.

I have heard a good deal lately about yellow fever from a friend who, last summer, had six cases in his house, one of which ended fatally. This was a very sad story of a young American, who had taken his passage home and sent off his luggage. He lived at Nichteroy, and was in the habit of walking about in the mists of early morning near the swampy lagoons without previously taking either a cup of coffee or any other refreshment, which is not only unwise but almost suicidal. Falling ill, he was treated during three days for intermittent fever, and went out. When his real malady was ascertained, he was put to bed, but nothing could save him, as he was most imprudent. One night, having told his attendant to fetch some iced seltzer water, which the doctor had ordered, the man on his return found the patient leaning with his body out of the window in the pouring rain. Eighteen hours before his death mortification set in, his back being all discoloured from the throat downwards. He died at 9 a.m. the next day, and the funeral was to be at 4 p.m. The coffin was screwed down, but the gases generated so quickly that on

lifting it to place it on the hearse the screws gave way, and the effect on the olfactory nerves along the whole of the road to the cemetery was quite awful. How fearful must have been the shock to the poor man's family who were expecting his speedy return, to hear, instead, of his death, and the painful circumstances connected therewith!

It appears to me, from all I have heard, that this fever must be most loathsome to all who have to come in contact with the poor sufferers. But it need not be dangerous, for Mrs. Fairall, the owner of this house, who has lived in Rio twenty years, and kept two boarding-houses in Larangeiras, has had the fever herself, as have also most of her family; she has nursed very many patients through it, and never lost a case; so that the doctors are always anxious to get hold of her, if possible, as nurse.

I received some hints about treatment which I may as well mention, though I hope I shall never have to put them in practice; but an acquaintance of mine who had the fever very badly in the summer has recovered, and looks in even better health than he was before. It is very important to take the fever in hand in its earliest stages—the first two or three days; the preliminary symptoms are headache, pain in the back, with nausea and feverishness. Begin by taking two tablespoonfuls of castor-oil, and drink iced milk and iced seltzer, or soda-water, *ad libitum*; but eat no meat food. The disease is blood-poisoning, and the best medicine is a certain acid. It is very important to keep up the even warmth of bed and to avoid chills. Patients can be cured even when the black vomit has begun, or when putrid blood oozes from their skin; but it is then a very bad case. However, smallpox is more dreaded than yellow fever; for though the latter specially attacks Europeans, particularly those who drink, or who are at all afraid of it, among

Brazilians it generally only affects those lately come from up country. There is an antidote daily advertised in the paper called "Anti-Yellow Fever Vaccination;" but I hear it is all a farce,* and that Pasteur's theory has not been worked out on this subject. Some such discovery is urgently needed, as there is no doubt the disease is a fearful scourge. A Dutch captain arriving in port when the fever was at its height was very nervous about it, and within three days the captain, his wife, nephew, and one or two others were dead; all the crew went off, and it was some time before a captain and crew could be found to take the ship back to Holland.†

I am told that Dr. Bento (Brazilian) and Dr. King (English) are the best yellow fever doctors; the latter has spent about twenty years in Brazil, and has a large practice, but he informed me the other day that there is still room for two good English surgeons in Rio.

* "It is worthy of note that Dr. Maximiano Carvalho announces in the *Journal de Commercio*, of the 13th inst., that some of the recent yellow fever cases are those of persons vaccinated with Dr. Freire's *microbios*."—*Rio News*, January 15, 1884.

† In 1882 the fever was very severe. From January to March, 10,000 or 12,000 died from it; sometimes 150 per diem.

CHAPTER X.

LAST DAYS IN BRAZIL.

Ascent of the Corcovado.

July 6.—After church I went for a cup of coffee and a little loaf to the Carioca Café, and then jumped into a Larangeiras tram-car *en route* for the Corcovado. I was told by some Brazilians afterwards that no one but a mad Englishman would think of going on such an expedition, firstly, on foot all the way when a horse could have been hired; secondly, in the heat of the day; thirdly, in top hat, frock-coat, and Sunday-go-to-meeting attire. However, I did it. For some two miles from the heart of the city the cars go southwards on the Botafogo Road, and then turn to the right at a square called Praça do Duque de Caxias, where are some very fine avenues of palms of a great height. The cars proceed thence up the Rua das Larangeiras, which is quite lovely with well-built and gaily painted houses in the midst of most beautiful gardens, and the road is lined by huge wide-spreading trees covered with hanging lichens; while between sunken walls on the left of the road flows a shallow stream, which is crossed by little wooden bridges to the garden gates of the various houses. As one proceeds, the road winds about and ascends slightly through a gradually narrowing valley, bounded by

two ridges descending from the Corcovado, forest clad throughout, and with "chacaras" (country houses) peeping out of groves of palms and clumps of bananas in clearings in the forest. Leaving the tram-car at its terminal point, 40 metres (131 feet) above the sea, at 1.45 p.m. I began the ascent, and, proceeding over a very rough, zigzag road, reached the fine broad main road, leading to the hill of Santa Theresa, at a height of 220 metres (621 feet), at which point I came to the railway in course of construction, which is being built by a private company, from Larangeiras to the summit of the Corcovado, on the central cog-wheel system—also employed on the Petropolis railway, which I shall hope to describe when I have visited it. At the point where I reached the railway, it crosses a very high viaduct on a steep incline ; the bases of the piers are of stone, and the superstructure of angle and tee irons, on which rest the girders (three spans, lattice), carrying the cross girders and rails, a hand-rail being placed on each side. Seen from above, or, indeed, from either end, this viaduct looks very awkward, the rails having a very ugly S curve—the cross girders being also laid to the same curve—which is decidedly objectionable. The engineering features at this point are the most remarkable part of the line, as the railway, after crossing the viaduct over a deep gorge, enters a tremendous cutting on a curve, with a still stiffer gradient of perhaps one in five, the cutting being at least a hundred feet deep. Leaving the viaduct, I walked up this cutting and proceeded partly over the banks and through the cuttings of the railway and partly by the road, making occasional short cuts along steep by-paths, inspecting *en route* the works of the railway and the well-constructed stone abutments at the edges of deep gorges, which are to be spanned by girders. The whole route lay

through dense forest of the usual luxuriant type; but the palms, cycads, etc., and large trees are more frequent, and the parasitic orchids and other epiphytes more luxuriant than in the high country of the part of Minas I was in. The birds, however, are fewer, and there are no parrots or monkeys, except a few marmosets, which is not to be wondered at, being so near the metropolis. There were occasional charming glimpses through the forest of the city and the Organ Mountains. At length I reached Peineiras, where there is a "chacara" and a few other buildings.

This spot is 439 metres (1430 feet) above the sea. The concessionaires of the railway intend building a grand hotel here, and founding a colony, to induce the citizens and foreigners to live up at this place during the summer instead of going to Petropolis, as this will be within an hour by rail and tram from the centre of the city, whereas Petropolis is considerably more than two hours' journey. It is certainly an enchanting spot, and magnificent views of the Atlantic are to be seen within a few minutes' walk.

On reaching the main shoulder of the mountain, the Atlantic burst suddenly in view, and from this point began the stiffest part of the climb. I gained the summit in one hour and seven minutes after leaving the train, including rests—tolerably quick, as the summit is 712 metres (2196 feet), which gave over two thousand feet ascent per hour. It was a stiff pull up, and, though shaded much of the way by the lofty forest trees and tangled masses of creepers, was intensely hot work. Every stitch on me was dripping wet, and I should have liked a cloak to ward off the chilly wind which blew over the top.

The summit consists of two rounded masses of bare rock, walled in to prevent accidents, which would be only

too likely to occur, as on one side the mountain descends perpendicularly over a thousand feet. On the summit are many steps cut in the live rock, without which it would be difficult to keep one's foothold. When I arrived there were three natives in shirt-sleeves and with long sticks. I thought how easily they might go for me, rifle my pockets, and throw me over the wall, a sheer thousand feet, into the virgin forest beneath. However, they did not perpetrate the ghastly deed, or I could hardly have written these lines.

How can I describe this view? It almost passes description. With a perfectly cloudless sky, the eye ranged from the Organ Mountains on the north side, some fifty miles away, to Cape Frio, seventy-five miles to the east, and to a cape beyond the Ilha Grande, near Paraty, some seventy miles or more to the west ; while to the south lay the broad expanse of the Atlantic, whose ripples broke in silver threads upon the sandy shores, or dashed against precipitous rocks. All the mountains on the Nichteroy side appeared a promiscuous mass of dark green hillocks. The whole of the Bay of Rio de Janeiro, with its countless islands, was mapped out. At a dizzy depth below lay the vast city ; its numerous morros, or hills, scarcely appearing to rise above the plain. The Sugar-loaf (1383 feet) seemed a ninepin. To the west—by glimpses through the rough-and-tumble forest-clad mountains, among which are the square-topped rock Gavea, and the Two Brothers—were lovely scraps of the Atlantic and the cape in the far distance, on the borders of the province of São Paulo. The horizon of the Atlantic was lost in haze ; but on its blue bosom were seen, as tiny white specks, ships in full sail, and one or two steamers. I watched one of the latter, the *Advance*, coming in from New York. It presently entered

the bay, and a puff of white smoke rose from its bows, followed a few seconds afterwards by the boom of the gun noting its arrival. Just below me lay the Botanical Gardens and the dark green slimy waters of the Lagoa Rodriguez de Freitas, its dirty and unhealthy waters contrasting wonderfully with the clear blue of the bay and the Atlantic, from which latter it is separated by a strip of white sandy beach. I could distinctly hear the pleasant jingle of the bells on the tram-car mules some two thousand feet below, and even the trampling on the hard setts, and could just see the cars crawling along, like specks, on the long straight white road; but the mules were hardly visible, or individuals either, unless they carried open umbrellas.

I stayed on the top for three-quarters of an hour, and then reluctantly descended through the cool forests, where the sun was then hidden behind the mountains. I heard the rushing brooks, saw the lovely waterfall, and an hour afterwards was in the tram. I shall never forget this day, and hope to go up once more before leaving Rio.

July 10.—Our chief departs for England in three days, so he gave a farewell dinner to the staff and some friends this evening at the hotel restaurant, Novo Mundo. The room where we dined is very large, magnificently fitted up, and had a profusion of flowers and plants. The dinner and wines were irreproachable; it is the only elaborate dinner I have attended since I have been in Rio, as, the Minister being in England, I could not follow up my introduction of a year ago by visiting him, and I have had no time to make friends. The chief had engaged a box for the opening night of a travelling English company at the St. Luiz Theatre, and thither we repaired after dinner. The pieces were "Pygmalion and Galatea," and a bur-

lesque, entitled "Ali Baba,"* which were very well rendered. The house was full of English, who applauded vociferously, as did also the Brazilians who were present. I met all the people I am acquainted with in Rio, and spent a very pleasant evening, though I do not favour theatres much as a rule, finally reaching Botafogo about 1.45 a.m., as the theatre was not over till long past midnight.

July 11.—Our good old ship, the *Cotopaxi*, came in to-day, and some of us rowed out to it this afternoon. Captain Hayes was, unfortunately for us, on shore, and some of the officers are changed; but we saw the first officer, also the first and third engineers, and had an enjoyable talk with them, telling them some few details of our experiences in the wilds of Minas Geraes. I played a joke on one of the saloon stewards, pulling out a roll of Brazilian notes and asking for change, which of course he would not give. I then begged him to explain to me the English coinage, which he proceeded to do, taking me for a Brazilian. My companions were much amused.

July 14.—To-day is the anniversary of the taking of the Bastille, and there was a great meeting of the French residents, who are very numerous, in one of the large Institutions in the city, which was decorated lavishly with palms and plants outside, and brilliantly illuminated by festoons of lamps across the street in every direction. By a most curious coincidence I was only reading last night the history of the event—quite forgetful that the anniversary was so near at hand—in Percy St. John's "Miranda." As I sat in my room in the New World, reading once again the story of that most awful revolution in the Old,

* The Brazilians insist on saying "Ali Baba and the Thirty-nine Thieves," which I cannot understand, as Ali Baba was not one of them.

I thought of the progress (?) of thought, and what now leads men to revolutionize, and how possibly there may be a mild revolution in Brazil on the death of the present Emperor (long may he reign, as he is the one man who keeps affairs at all in order), picturing to myself the possible disintegration of the empire into a confederation of provinces such as obtains in the United States, etc., etc.

We are now drawing near the end of our stay here, and I remember that I have never described the view from our office windows. It is situate in the centre of the great coffee warehouses, and every pound of coffee that leaves Rio passes in waggons along the tramway past our door to the docks, therefore the traffic is considerable. Our look-out is, indeed, different from anything that thousands of Englishmen in the old country see from the windows of their offices or warehouses, where they spend the day, often—alas! too often—without any view whatever. This office is a fine large room on the first floor, facing south, but always cool; whence, passing along a passage to the back of the house, which is on the wharf by the bay, we gain a magnificent view, bounded by the Organ Mountains. The front windows of the office look out on a triangular space, paved throughout, which from dawn till 3 p.m. is dotted over by covered stalls, where the men employed in shifting the coffee from the various warehouses repair to take their meals. On the opposite side of the triangular space are some dozen houses, shops, and cafés, one being an English restaurant for sailors; of one, two, or three stories, only two being of the same height; they are painted red, blue, yellow, or brown, or else the face is covered with glazed tiles in patterns. Some of the houses have balconies, wherein occasionally fair damsels, or at least damsels fair by courtesy—for some of them are black

as Erebus—loll about and take the air. Behind this row of domiciles rises the Morro da Conceição, Hill of the Conception (154 feet), covered with more or less picturesque, irregularly built houses, and crowned by a bastioned wall, which encloses the bishop's palace and the ecclesiastical chambers. A few bananas and red-leaved trees are dotted about, some twenty telegraph and telephone wires traverse our triangle, numerous clothes-lines are erected on the top of the houses, while multitudes of children—white, black, and brown, both clothed and almost unclothed—play about everywhere, dogs abound, and cats growl and fight on the brown-tiled roofs.

July 18.—This evening our fellow-lodger, Mr. Hector, with whom we have struck up a great friendship, brought two gentlemen to stay here, Messrs. Hoffman and Lattman, of New York. They arrived by the *Advance*, whose entry into the bay I mentioned as having watched from the summit of the Corcovado. They are very pleasant and conversable, and detailed some of the experiences of their voyage. Going on shore at Maranhão (Maranhã), they visited the market, which they described as abominable. Mr. Hoffman said he saw there the thinnest dog that ever existed, remarking, "You could see to read a small-type newspaper through his body." He wished it could have been photographed as a curiosity. The feeding on the North-American liners is bad, and it appears the purser is not allowed, as a rule, to buy food on the way; however, being remonstrated with, he bought some fowls, which were cooked. Some of these happened to be of the peculiar black-skinned type which I have often met with up country. They certainly look disgusting, though their flesh is as good as others. Our friend, however, was upset, and remarked to the purser, "I don't know where these

fowls were educated and brought up, but I guess they've a dash of nigger blood. I reckon I'll go out."

July 20.—After church I again ascended the Morro do Castello; the Organs were entirely hidden by clouds. I then returned to Botafogo, and walked with Mr. Large up the Corcovado, by the same route as on the 6th, to the viaduct, through the cutting, and some distance beyond. Great progress has been made in the last fortnight in laying the rails, etc. We returned along the line of the railway to the Rua Cosmo Velho, at the upper end of Laranjeiras, the engine passing us on the road, drawing a truck, in which, among many others, were two friends,* who hailed us. We examined the station, the engines, and the passenger coaches. An additional portion of the line has just been inaugurated; it appears that this farcical ceremony is gone through over every few yards of rail which are laid.

Trip to Petropolis.

July 22.—Deciding at 12.30 to go up to Petropolis by the afternoon boat, I left the office, rushing off for some lunch, and to Botafogo for a few necessities. The steamer went off at 3.30. The price of a single fare was \$7 500 reis; I could not get a return ticket, as these are only issued on Sundays, when there is a cheap trip—\$8 return, first class—leaving the Ferry Prainha at 7 a.m., and returning from Petropolis at 4 p.m. Before the steamer left, I was interested in watching several canoes, of the well-known coffin shape, plying from ship to ship, propelled by one or two men with broad paddles from the stern.

As it was a cloudless day, the view was perfect; and when we were well off the shore, on looking back

* Mr. Colin Mackenzie and Mr. W. H. Glover.

we saw the picturesque town, over which hung a streaky band of smoky haze, and beyond, rising into the sky, the bold outline of the Tijuca range. We soon neared the Ilha do Governador, and were passing among numerous islands; some, mere heaps of stones or boulders, or even solitary rocks just peeping above the water; others with a little grass and a few shrubs, and yet others with luxuriant vegetation, reaching to the water's edge. Some of the islands possessed one or two houses or cottages. The Ilha do Governador, twenty miles in circumference, is very prettily undulated, thickly covered with vegetation, with numerous picturesque bays, and, I believe, a tolerable population. On nearing Mauá, where we disembarked, the water was just like oil, and the waves produced by the passage of the steamer were most remarkable, being a series of very regular undulations with absolutely not a ripple, there not being the least breath of wind. The view looking back towards Rio was very beautiful—the curiously undulating water in the foreground; the Ilha do Governador, with its deep green vegetation, in the middle distance; and beyond, rising clear into the cloudless sky, the pyramid of the Sugar-loaf; and a great part of the Corcovado and Tijuca ranges, the former appearing very insignificant. Turning on one's heel, we find we are rapidly approaching a wonderfully green, crescent-shaped shore, scrub clad to the water, without a sign of any habitation, and apparently no place for landing. In a few minutes we see a stage built out into the bay; and, leaving the steamer, after an hour and five minutes' run, we find ourselves on a platform, where waits the train that is to convey us to Petropolis. This railway, of a metre gauge, was the first constructed in the empire; but for many years it extended only to the Raiz da Serra

(foot of the hill), whence, to reach Petropolis, it was necessary to drive by diligence up a well-made, broad, zigzag coach-road. The train was composed of one first and one second class carriage, which rapidly became tolerably full. The seats and backs are of closely interlaced bamboo, the backs are reversible, and, being only about two feet six inches apart, do not afford much room. Five persons sit on each seat, and each carriage holds sixty people. Leaving the platform, we proceed over low ground through a flat, sandy, bush-and-thicket covered country of luxuriant shrubs, entangled and entwined by thorns and creepers, the monochromous vegetation being relieved by an occasional bright spike of flowers. At 5 p.m., on reaching the second station, our engine, which had been in front, was changed for one with a central cog-wheel, placed at the rear of the train, and then we began rapidly to ascend by a grade of sometimes one in five or so, and so quickly that I could *see* the needle of my aneroid falling. We passed through the grandest mountain scenery, huge perpendicular masses of rocks, covered with trees on the top, rising from the dense virgin forest which covered the hilly sides of the valley. After a quarter of an hour's ascent, we had a superb prospect. We could see along the flat scrub to Mauá; at our feet a straight white line, showing the road we had just traversed, surrounded by hillocky woods; then the bay, the Ilha do Governador, the mountains round Rio, the entrance to the bay, and the broad Atlantic beyond, some thirty miles away. At 5.30 we crossed the Grotto Fundo, which, as its name implies, is a gorge of a tremendous depth, spanned by a viaduct constructed in a similar manner to that which I described on the Corcovado railway. Here we are in the most impressive scenery there is on this line, in the midst of a grand amphi-

theatre, extending for three-quarters of a circle, surrounded by the virgin forest, which is walled round by the most fantastic lofty mountains of perpendicular rock, while beyond the outlet of this majestic amphitheatre lies clearly mapped out every detail of the picturesque bay. Just beyond the Grotto Fundo is a masterpiece of engineering skill, both from the boldness of the conception and the admirable manner it has been carried out, though the sight almost makes one shudder. The railway is carried in *mid air* by means of cantilevers, or girders fixed into the face of a vertical rock, so that one can look out of the window and touch the rock while gazing upon the green forest at a dizzy depth below.

By 5.35 we had gained the summit ; and, again changing engines, left the cog-wheel track, and proceeded through scattered houses to the station of Petropolis, where we arrived at 5.40, having thus been two hours and ten minutes *en route*. The barometer was at 27.50 ins., and, as we started at 30 ins., this gave a rise of approximately 2500 feet. The summit of the railway where it joins the cog-wheel line is 100 feet (by aneroid) above Petropolis. The air now felt very cold, and although the thermometer stood at 65° (and it was 60° at 10 p.m.), my feet became almost as cold as ice. It is curious to feel this effect of cold with the thermometer registering a temperature that in England—and even lately at Rio, in the early morning—is comfortable. In England such a temperature is warm ; in Rio it is cool and invigorating. I suppose this chilly sensation is due to the rapid change from the comparative heat of Rio to the rarer air and icy mountain breezes.

Taking the hotel carriage, I drove in five minutes to the Hotel MacDowel, now kept by Mr. Mills, an Englishman, where I enjoyed a good dinner, in company with

a Brazilian lady, her daughter, and an English engineer, Mr. A. Welby, who, as I subsequently learnt, is working on a proposed prolongation of this railway, which is to extend some fifty miles further. Our dinner-table looked desolate, as it was "muita comprida" (very long) and elaborately decorated, but with only a lamp or two at one end for the four guests who at present are staying here. Petropolis is quite empty now, being the depth of winter.

July 23.—A cloudy morning, but warm and pleasant ; so I went for a stroll through the village before breakfast, and then round the hotel garden, where camellias, azaleas, arums, roses, and geraniums were mingled with cactuses and other tropical plants and flowers.

Before describing my day's walks, I must say a few words about the town.

Petropolis, or the city of Peter, is so named because it owes its foundation and development to the Emperor Pedro II. It is situate 803 metres (2634 feet) above the sea, and is the summer residence of the Emperor, Empress, and Royal Family, and of the foreign diplomatic circle. It possesses five hotels, besides restaurants, six colleges and schools, three musical clubs, and numerous other noteworthy buildings, besides having a complete system of telegraphs and telephones ; and it issues two journals, one bi-weekly *O Mercantil*, one weekly *O Arauto*, each of which costs 100 reis, or 2*d.*

Many merchants and others live up here, journeying to and from Rio de Janeiro every day since the railway, Principe do Grão Pará, has been opened. This mountain railway was begun August 1, 1881, and opened in 1883.

Petropolis is supposed to be one of the healthiest localities in the world, and it is certainly a unique and beautiful spot, with great variety of scenery. There are

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RUA DO IMPERADOR, PETROPOLIS.

three principal streams flowing through the town, the Rio Quitandinha, Corrego Secco (dry stream), and Rio Piabanha; the two former flow in opposite directions down the main street, Rua do Imperador, joining at the Praça (square) Dom Pedro II., the combined waters thence going off at right angles along the Rua da Imperatriz, past the Imperial palace, which is in the midst of beautiful gardens. After flowing some distance through various streets, they join the Piabanha, which, at some leagues' distance, empties itself into the Parahyba do Sul, on the borders of the Province of Minas Geraes.

The railway station is at the north-east end of the Rua do Imperador, by the Corrego Secco. This street is exceedingly picturesque. The two streams, though flowing in opposite directions, form a straight line. They are sunk some feet below the level of the road, bounded by retaining walls, and crossed by numerous wooden bridges. On each side the stream are grass borders and trees, a broad road, a footway, and a row of good shops, painted with various colours and prettily ornamented. Five minutes' walk from the station—along the street in a south-westerly direction—brings the traveller to the Praça Dom Pedro II., where are two small but pretty public gardens, with numerous benches under the shade of the trees; another two minutes and we reach the Rua da Princesa Dona Januaria, wherein is my hotel.

From Petropolis starts the very important and excellent road of the União e Industria Co., which, beginning at the end of the Rua Westphalia (which I shall refer to later), at the southern extremity of the town, proceeds by way of Entre Rios to Juiz de Fora in Minas Geraes, with a total length of 232 kilometres (145 miles). After passing along the banks of the Rio Piabanha, the road follows the magni-

ficent valleys of the Parahyba and the Parahybúna (which I have previously mentioned) to its termination. A service of coaches runs every day between Petropolis and Entre Rios, under the direction of Mr. John M. Morritt; they travel over this road, on which are many toll-gates, the monthly receipts through tolls being about fifty contos of reis (\$50,000), or £4200. Our two American friends have, within the last few days, made this trip, returning to Rio by the afternoon train from Entre Rios, and they declare that nothing can be more beautiful, or repay one better, than this most enjoyable drive.

Now, *revenons à nos moutons*, or, rather, to my walk. After breakfast I started on foot to pay a visit to the Cascatinho, a celebrated waterfall some four miles distant, having previously received directions as to the route. Fortunately, as it turned out, I missed my way, so had the pleasure of going by one route and returning by another. The way I went is evidently not much frequented, but is by far the more interesting and wilder of the two. After passing the palace, I continued straight up the Rua da Imperatriz to the end, when I should have turned to the left following the Quitandinha, which is a part of the waters that supply the cascade; however, I went to the right, and soon left all traces of civilized houses behind, and, crossing a small divide, entered a narrow gorge, called Gruta das Saudades (Grotto of Earnest Longings), which was most beautiful, densely wooded, with a few clearings and huts. Soon the ravine widened considerably, and I was vividly reminded of the side valleys of Les Ormonts and Champéry, off the Rhone Valley in Switzerland; further on, the scenery of Perthshire, or Pen-y-gwryd near Snowdon, was brought before me; only in these parts there are trees on the summits of the highest rocks. After

a time the road, which is the Antigo Caminho de Minas (old road to Minas), died out completely, and I had to cross a broad burn, the Rio Itamaraty, full of lichen-covered boulders; and at length, by following this river, in an hour and three-quarters after leaving the hotel, I reached the great cotton factory, named Petropolitana, which is situated in a wild bare spot in a broad valley at the junction of the Itamaraty with the Piabanha, below the waterfall of the latter, and surrounded by mountains almost devoid of any vegetation except burnt-up grass. I visited the manager, but being unprovided with an introduction was not allowed to inspect the works; however, I saw something, as I had to pass through several shops to find the manager, and I also looked through an open door into a large room where were two or three hundred men and women attending to spinning machines. All the machinery is worked by the power derived from the Cascatinho, where the Piabanha—which after leaving Petropolis descends by a very easy gradient—suddenly dashes over some six hundred feet of rock, just above the cotton mill.

Leaving the mill, I ascended by a private road towards the main coach-road, and then examined the contrivance for making use of the river. The waterfall was represented—being now the dry season—by a thin thread trickling over the smooth face of rock, the main body of water being led away for about two or three hundred yards, and then sent down an almost vertical pipe, some two feet six inches diameter, to the turbines of the mill. I then gained the coach-road from Petropolis to Entre Rios, and a splendid road it is—broad, well made, well kept, with large heaps of broken granite at the roadside every few yards, after the most approved English Macadam system. Just after reaching the road I came to a stone marked “9 K.,” and

was rather surprised, not thinking I was as much as nine kilometres (five miles and a half) from Petropolis. Continuing to rise for about a kilometre, and passing some fine rapids (*Cascata do Retiro do Bulhões*, *i.e.* Cascade of the Retreat of the Source), I came to a toll-bar. From this point the road appears level, and follows the Piabanha to Petropolis, winding between high rounded hills, whereon the forest is more or less cleared, and the land cultivated, with a few houses and gardens dotted about. At the "6 K." stone the houses become more numerous, and the first bore a label, on which was painted, "Rua Westphalia." I then passed a tablet inserted into the rock on the roadside, stating that this road was begun by the União e Industria Co., April 12, 1856, under the auspices of the Emperor, and in the presence of his Majesty and the Empress. Another few minutes' walk, and I was once more opposite the palace; so I am at a loss to understand to what locality the distances marked on the stones refer, nor could any one enlighten me. The return journey was very much shorter and easier than the outward, and occupied one hour and a quarter; so I arrived shortly after 2 p.m., and spent the remainder of the afternoon strolling about the town.

Petropolis is a German colony, and the streets are full of charming children, with plump rosy cheeks, flaxen hair, and blue eyes; while at every step you hear the language of the Fatherland, and the pretty faces are such a treat, after the sallow, thin, sickly looking white children that I have seen for the past year. I bought a neat little walking-stick, cut from a coffee-tree, and made by a certain Carlos Sprangenberg, as a memento of my trip.

As I came off here in such a hurry, I had no time, as I had wished, to obtain introductions to some of the resident

gentlemen, one of whom has a splendid collection of orchids, and another possesses a large number of butterflies. However, my long walk was nearly enough for one day, and as I could afford no more time, I must be satisfied with what little I have done. At least, I am delighted that I took the opportunity of the only day at my disposal to have a glimpse at this lovely Alpine village, which will long remain impressed on my memory as something very un-Brazilian like, owing to its German Protestant community and the absence of negroes.

July 24.—I left Petropolis by the 7.30 a.m. train, Mr. Mills and his fair-haired young daughter accompanying me to the station, which gave me the opportunity of expressing my extreme satisfaction with my brief visit and his kind reception.

The morning was cool and cloudy, with much mist ; so there was no clear view from the Grotto Fundo, the waters of the bay being undistinguishable from the strata of the clouds. From the bay itself only the top of the Sugar-loaf was visible at first, and as we neared Rio even that was concealed by the clouds. By 9.45 I was at the office, and employed the rest of the day in packing up.

I must conclude the account of my trip by a short description of the drive up the mountain to Petropolis before the days of the railway, in words, as is usual with the Brazilians, far more poetic than I can lay any claim to possessing the power of producing. "The ascent of the Serra da Estrella (Mountain of the Star) is of itself a most agreeable trip, whilst enjoying the purest breezes of the world. There is much to admire—waterfalls, cascades or rapids, grottos, enormous rocks, trees of a thousand exquisite shapes, and splendid panoramas over the bay are seen every moment—so that the traveller, soothed and

enchanted by such animated and magnificent spectacles of prodigal intertropical nature, passes over two hours without knowing it, receiving every moment the most agreeable impressions never before realized." *

I had the misfortune to leave my little coffee-stick behind me at Petropolis, but wrote on board the steamer to Mr. Mills, asking him to send it ; and two days afterwards had the pleasure of once more gaining possession of it by calling at the office in Rio. Wonderful to relate, in this city of extortion, it came down free of charge !

July 25.—The *Valparaíso*, which is timed for tomorrow, has not yet been telegraphed ; and so, having finished packing in anticipation of leaving Brazil tomorrow, I set off with Bithell for Tijuca, another of the places near Rio which every one ought to visit. We went by tram as far as we could, along a picturesque though perfectly flat road, lined by many handsome houses in detached gardens, or large pastures with groves of wide-spreading and lofty mangoes. An hour's drive brought us at 1 p.m. to Andaraí, at the foot of the mountain whereon is Tijuca ; and, there being no diligence up to the village at that time of day, we ascended on foot, under the most grilling sun, along a very picturesque road, but, unfortunately, without much shade ; and at length we gained the top of the pass, where there is a stone with the level 350'01 metres (1148 feet) cut on it. Passing through the lovely village, we most thankfully came to an anchor at Whyte's Hotel by 2 p.m. After "refrescos" of lemonade with a dash of whiskey in it, we telephoned to the office in town, and heard there was still no tidings of our vessel ; and so, while lunch was being prepared, we went for a saunter through the lovely grounds. The heat was so great and

* "Guia do Viajante no Rio de Janeiro," 1882.

the time at our disposal so short that we were not tempted to ascend the alluring mountain Bico do Papagaio, so called from its two peaks presenting the appearance of a parrot's beak, which towered into the cloudless sky on our right ; so we strolled up the stream, visiting the neat little bathing-places for men and for women. In the former a Scotchman met his death a short time since. He had just arrived from England, and was staying at the hotel, when one morning, after taking some medicine, he very foolishly went to bathe, and was discovered in the bath dead from apoplexy. The baths are over-shadowed by clumps of my favourite bamboo ; the water of the stream flows through cemented tanks, which have steps descending from the dressing-sheds. In the ladies' portion, higher up the stream, is a small shallow tank for children. We then returned, plucking sweet violets on our way, to the hotel, where there are at present no visitors, and amused ourselves by overhauling the visitor's book, where I read the following entry : " January, 1879, Queensbury ; Captain Brough, R.M.S. *Britannia* (Pacific) ; Sir Beaumont and Lady Florence Dixie, Bosworth Park, Leicestershire ; Lord James Douglas."

I admired the scenery here even more than that of Petropolis, and yearned to be able to remain longer ; but it could not be, so after lunch we caught a diligence and drove back to the tram. We were, of course, outside the vehicle, and at such a height above the mules, which galloped along very rapidly, that on turning the abrupt corners of the zigzag road it was with some difficulty we kept our seats.

The highest point in the Tijuca range is 1025 metres (3362 feet). There are some twenty places of interest which should be visited, among them the celebrated Chinese view, whence is a beautiful bird's-eye view of the

Corcovado, the Sugar-loaf, and the entrance to the Bay of Rio. The Pedra da Gavea is also very well seen from this neighbourhood; but from its extraordinary shape it is an object of interest from every point of view.

July 26.—We visited the waterworks called Reservatório Dom Pedro II., situate on the Morro do Pedregulho (Hill of Gravel), driving thither by tram along the St. Christovão (St. Christopher) route, about three-quarters of an hour out, partly along the road to Tijuca. It was again a grilling and cloudless day, and so from the Reservoir grounds, which are well kept, we had a beautiful view of the western portion of the Bay of Rio, with its numerous pretty eyots and larger islands, all covered with trees and verdure. I have now seen the bay from many points, and at each place find fresh beauties in the ever-varying foreground, though the wondrous gigantic Organs always form the background. It would be pleasant, indeed, to spend a month cruising about the bay, which is about one hundred miles in circumference, visiting the different islands, and making excursions to some of the many hilltops.

The large covered distributing reservoir was empty and being cleaned out, so we were able to see it. It was begun in December, 1876, and completed in May, 1880. Its dimensions are 102 metres (334 feet) by 82 metres (311 feet) by 5 metres (16 feet) deep, and the capacity 8,800,000 gallons.* It is roofed by a series of twenty segmental brick arches. Situate 147 feet above the sea, it is supplied by the waters of the rivers Ouro and St. Antonio, which come a distance of thirty-two miles, and flow through syphons into the small receiving reservoir at 180 feet above the sea. A new reservoir, about the same size as the existing one, is in course of con-

* Condensed from "Guia do Viajante no Rio de Janeiro."

struction ; all the shafts, on which rest the vaulted brick arches of the roof, are of solid stone.

July 27.—I made my second ascent of the Corcovado ; but this time I was not alone, being accompanied by Mr. Large, Mr. Hector, and the two American gentlemen. Instead of going by the Larangeiras route, we went into town, and then under the celebrated aqueduct, along the Rua do Riachuelo to the Plano Inclinado, or steep tramway, up the Morro de Sta. Theresa.

The length of this line is 561 yards, and the steepest grade about 1 in 7. Besides numerous other bridges, there is one fine lightly constructed lattice bowstring of 120 feet span. The line was opened in 1884. More than two-thirds of the route is double, and the cars, of which one ascends while the other descends, are attached to a wire rope, worked by a stationary engine at the upper end of the line.*

On leaving the inclined plane at 85 metres (279 feet), we entered a tramcar that proceeded about a mile over a steep and very tortuous road, by the side of the great aqueduct, to the reservoir of Sta. Theresa, at 158 metres (511 feet), enjoying along the whole route beautiful views to the north, over the St. Christovão district, and that portion of the bay which we saw yesterday from the waterworks. As the tramway extends no further, we then walked along the Rua do Aqueducto. Still following the aqueduct, which is entirely covered in over its whole length, but has many gratings to admit the air, we at last reached the place called Mae d'Agua (Mother of the Water), 306 metres (1004 feet) above the sea. These are the most ancient reservoirs in the city. It is a little paradise in the midst of the forest. A soldier, apparently on guard, glared at us as we entered

* Condensed from "Guia do Viajante."

a small but beautifully kept garden, brilliant with plants and flowers ; and ascending some steps, we arrived at the five tanks, into which flow the cold and crystal waters of the Rio Carioca. This river, rising in the forest between the hills of Tijuca and Peineiras, passes thence into a small building at the entrance to the aqueduct. The cool air, the rushing water, the music of the waterfalls, and the lovely flowers were indeed delightful after a two-mile walk under a cloudless sky, in the midday sun ; though the road, broad and well kept, was mostly under the shade of the forest. " It is excessively poetic and enchanting to see the waters of this renowned stream rippling through the lofty forest, dashing into the reservoirs, and thence rushing into the aqueduct."

The earliest inhabitants sought for the waters of the Rio Carioca, which enjoyed a great reputation among the natives, for the supply of the population. The first canals for conducting the river into the city were made in 1657 ; the magnificent aqueduct, as it now exists, was completed in 1750. It is some eight miles in length, and passes over the Rua do Riachuelo on a row of two series of arches, one above the other, with forty-two spans, at a height of about a hundred feet above the street, extending from the Morro Sta. Theresa to the Morro de St. Antonio. With the exception of the substitution by the City Improvements Co., a few years ago, of one large and lofty arch instead of the double tier, where the aqueduct crosses the street, no alteration and scarcely any repairs have been necessary during the 154 years that it has existed. The aqueduct terminates in the Largo da Carioca, the square which is the principal starting-point for the tram-cars to Laranjeiras, Botafogo, and the Jardim Botânico. Here there is an extensive fountain built of granite, the largest in the city ; but,

unfortunately, its architecture is unworthy of the beautiful aqueduct.

As long since as 1537 the waters of the Rio Carioca were praised by Gabriel Souza, who states that the Tamoyos (native Indians), who inhabited the borders of the bay, had a tradition that its waters possessed the virtue of inspiring their poets and musicians. It was supposed also to have the power of curing melancholia and hypochondriasis. The word "Carioca" has many interpretations, of which the most probable appears to be from *Kaa-ry-og*, "the house of the stream from the wood."

Leaving the lovely Mae d'Agua, we soon came to the road from Larangeiras, and I took our friends to examine the railway viaduct. We then quietly ascended the Corcovado by the same route that I have previously described, and were again favoured with a cloudless view of the splendid panorama, with which all were as much enchanted as I was on both occasions. At length, the sun being low on the horizon, we were forced to tear ourselves away, and, walking down in the cool, took the tram back to our quarters at Botafogo.

July 28.—After having been in a state of expectancy, awaiting the arrival of the *Valparaiso* for the last two days, she really came in this morning; but as she was supposed not to leave till to-morrow, I had hoped to spend the afternoon in paying farewell visits, which the excursions of the last few days—when at length I was freed from the daily routine at the office—have, of course, prevented. However, we were informed that we must embark at 3 p.m., as the steamer would depart at four; consequently, most reluctantly, I was obliged to forego saying adieu to the few friends I possess here, as they lived at some distance, and went instead to the market to buy some birds.

Though delighted at the thoughts of being so soon *en route* for home, I could not, without mixed feelings, look round on the city for the last time. Fortunately the day was dull—heavy clouds covered the mountains, the bay was a dirty green, and everything appeared dusky and dark—so that I had not the additional sorrow of seeing the lovely scenery in its most attractive light. But why should I linger, and prolong the agony? A steam launch came for us soon after three; we stowed our voluminous luggage on board, and in company with Senhores Dantas and Freitas, who have proved very kind friends, and Mr. Bithell, we stepped off the quay, and were once more, after thirteen months in Brazil, on the water. Adieu, fair Rio! I have passed many pleasant hours in your beautiful city. Shall I ever again set foot on your shores?

Additional Notes on Rio de Janeiro.

During the two months I spent at Rio, being daily engaged at the office from ten to five, with the exception of Saturday after two, and Sundays, and the last few days, I was unable to visit a hundredth part of the places I wished to explore, therefore cannot from personal knowledge give any more detailed account of the city and its environs, though I must briefly refer to the tramways and one or two other points which came under my notice. But, first, as it may be of interest, I will give a short account of its origin.

*Foundation of the City.**

The French Huguenot, Nicholas Durand Villegaignon, Knight of Malta, and Vice-Admiral of Brittany, who was already celebrated for his exploits, desiring to propagate Calvinism in the New World, conceived the idea of founding

* Condensed from "Guia do Viajante."

in Brazil—the natural riches of which country were said in France to be marvellous—a kind of independent sovereignty, which might serve as a refuge for the followers of Calvin, whose opinions he professed.

Villegaignon sailed from Havre, July 12, 1555, in charge of two well-armed ships, which the Court of France had confided to his care, and, November 10, 1555, entered the Bay of Ganabára (Rio), whose shores were still uninhabited except by the natives. He first disembarked on the island Lage, at the mouth of the bay, whereon is now a fort ; but, finding that island covered by waves during stormy weather, he removed to a larger one, which now bears his name, and on which is a fortress. Here he built a fort, calling it Coligny, in honour of Admiral Gaspar de Coligny, the protector of the projected colony. Villegaignon was hardly settled when he sent a ship to Europe, giving an account of the happy result of his expedition, and begging for reinforcements. On March 16, 1557, came the fleet, directed by Bois le Comte, nephew of Villegaignon. It had arrived at Espirito Santo on February 26, having left Honfleur November 19 of the preceding year, and consisted of three fine ships, armed with eighteen bronze guns, and manned by nearly three hundred persons, all equipped at the cost of the Court of France. Two Calvinist ministers accompanied Bois le Comte, one of them being Jean de Lery, a Genevese, to whom we owe an important work, "*Histoire d'un Voyage fait en la Terre du Brésil*," printed at Rochelle in 1578, in which he treats of the expedition, and gives curious accounts of the indigenes among whom he lived.

Villegaignon received the new expedition with the greatest joy, established an ecclesiastical system, asked the clergy to preach twice every Sunday and once during

the week, and to have prayers every night. Thus the French took possession of the Bay of Rio de Janeiro, and soon gained the affection and friendship of the indigenous Tamoyos and Tupinambás who populated its shores.

But King João IV., taking notice of this establishment in a land which belonged to his crown, although he had not taken possession of or colonized it, ordered Duarte da Costa, Governor-General of Bahia, to inform himself personally of the condition of the French Protestants. At this time the monarch died. However, as news came to the Court that the French colonists were increasing in numbers and gaining more strength and more lands, the Queen Regent ordered Men de Sá, successor to Duarte da Costa, to expel them, sending for this purpose two war-ships. The Governor augmented the squadron by other vessels, which happened to be in port, and embarked January 10, 1560, picking up volunteers on his passage down the coast.

Villegaignon, having quelled grave discords in his colony, had left in a hurry for France, in October, 1559, and the Governor-General of Bahia entered the Bay of Rio on February 21. On the 15th of March he attacked the fortress of Villegaignon, and fought all day, continuing the fight at intervals during the night. The next day, in spite of heavy fire from the fort, Men de Sá determined to take the island, and, landing on the side of the Hill of Palms, took it by main force. The fight lasted two days and two nights, with many acts of valour on both sides. At length the French, being without powder or water, were conquered, and, retiring by night in their canoes, repaired to the mainland. Over a thousand natives were allied with the French, while the Portuguese numbered only a hundred and twenty, with one hundred and forty natives. "If this victory did

not so much concern myself," said De Sá, "I would affirm that there will be many years without its equal between Christians." Men de Sá, however, being unable to retain the island, demolished the fort and left for Bahia.

The Portuguese armada having retired, the French returned to the island, rebuilt the fort, and continued to reside there, and as soon as other ships arrived with more people, there being no longer any one to hinder fresh buildings, they fortified themselves on *terra firma* more securely than before. When this news reached Portugal, knowing how convenient it would be for the Crown to fortify and people the port, Estacio de Sá was sent with two galleons to his uncle, Men de Sá, who was ordered to assist him, with all the forces he could gather, to found a colony at Rio de Janeiro and expel the French.

Estacio de Sá arrived at Bahia early in 1564, and remained there that year while the Governor was preparing the expedition. At the beginning of 1565, Estacio de Sá left Bahia with his fleet, and arrived at the entrance to the Bay of Rio February 6; but was compelled to return as far as Santos for reinforcements, finally leaving the port of Buriquioka (now corrupted to Bertioga) on the 26th of January, 1566, and arriving at the bay early in March. The chief captain landed the soldiers, and took up his quarters near the Sugar-loaf, on the ground now called Praia Vermelha. The troops cut down the forest and made fortifications. During the whole of 1566, the Portuguese could hardly maintain themselves in their forts, as the enemy's forces were superior; and on the 15th of October the French, aided by the Tamoyos, attacked the vanguard of Estacio de Sá, but were repulsed.

Estacio de Sá termed his colony a city, dedicating it to St. Sebastian, in honour of the young King of Portugal.

Men de Sá, hearing of the embarrassed position of his nephew and his need of speedy help, prepared a new expedition, and sailed with it from Bahia in November, 1566. In passing Espirito Santo, he gathered there two hundred natives, commanded by the celebrated Azaryboia, who, after his baptism, was called Martim Affonso de Souza, and arrived at Rio January 18, 1567. His presence gave great pleasure to the forces under Estacio de Sá, who were in want of ammunition and food. On the 20th of January, being the feast of the patron saint of the city, Men de Sá began his operations.

On that day he took the stronghold of Urusumirim, but during the battle a poisoned arrow entered the face of Estacio, who died a month afterwards from the wound. "Thus he lost his life," says Varnhagen, "in the same manner as the patron saint of the city he founded, on whose day he was wounded, and the symbols of whose martyrdom became its insignia."

After the first victory followed the attack on the island of Paranapukuy (now do Governador), which was also conquered; the Portuguese then occupied the whole bay, the French fled on board their ships, the Tamoyos lost their freedom and became quiet. "Never was there a war," says Southey, "from which, such small forces being engaged on each side, such important results followed. Had Men de Sá or Nobrega (one of his captains) been less able, this city, to-day the capital of Brazil, would be French, and not Portuguese." After this heroic feat of arms, the Governor-General removed the nucleus of the city from the neighbourhood of the Sugar-loaf to the Morro do Castello, still under the patronage of St. Sebastian, but added to that name "of Rio de Janeiro." He appointed Salvador Corréa de Sá, another nephew, chief

captain of the new colony, as he had taken a great part in its conquest. The Indian chief, Azaryboia, who had likewise distinguished himself in the expedition, was placed with his people on the other side near Nichteroy, and Men de Sá, having arranged all these matters, returned to his seat of government at Bahia.

The city to this day keeps a religious octave in memory of the triumph obtained on the 20th of January, 1567, illuminating the public buildings, convents, churches, and private houses, and firing salvos at 8 and 10 p.m. on the 17th, 18th, and 19th of January. On the 20th, the image of the saint is carried in procession from the Imperial Chapel to the church on the Castello Hill, the fortresses firing a salvo at the departure and another at the arrival of the procession, this ceremony being repeated on the octave.

In 1583 the mortal remains of Estacio de Sá were removed from the neighbourhood of the Sugar-loaf to the Church of St. Sebastian. In the centre of the chief chapel of this church is a granite slab, bearing the arms of the house of the De Sá's, with this inscription, "Here lies Estacio de Sá, Captain and Conqueror of this land and city. Salvador Corraè de Sá, his first cousin, the second Captain and Governor, erected this slab. The chapel was finished 1583." On the 16th of November, 1862, the bones of Estacio were taken from their ancient resting-place, in the presence of his Majesty the Emperor and the members of the Institute of History; and on the 20th of January the following year, were solemnly placed in an urn of brazil-wood, which was put into a leaden coffer, this being enclosed in a sarcophagus of stone, and with it the deed of exhumation, daily papers, gold and silver coins, and medals. The opening was closed by a stone bearing this

inscription: "The mortal remains of Estacio de Sá, exhumed from this sepulchre November 16th, 1862, restored to it January 20, 1863."

The French, however, were not prepared to give up all thoughts of gaining a foothold at Rio, for in August, 1710, an expedition of five ships and a thousand men tried to enter the bay; but being repelled, they landed at Guaratyba, marched on the city, and arrived at the palace of the Governor in the Rua Direita, in the centre of the town. Again repulsed, they entrenched themselves in a warehouse, which was bombarded, and the French compelled to yield as prisoners of war on September 19. Their leader was murdered by two cloaked assassins, March 18, 1711. On the news reaching France, the celebrated general, Duguay-Trouin, was sent to avenge him with eighteen ships, which entered the bay after losing three hundred men. The cowardly Governor fled from the city, with some of the troops, and the panic-struck populace likewise escaped from their houses to the forests. The French entered the city and occupied the principal points of vantage. At length the Governor consented to pay Duguay-Trouin 610,000 cruzados (£54,900) and five hundred cases of sugar; and, having received this, the famous French expedition retired victorious.

In 1762 the city was declared capital of the State of Brazil.

On March 7, 1808, the Braganza Royal Family arrived from Portugal. Those who are interested in the history of Brazil from that period to the abdication of the Emperor Dom Pedro I., in 1831, I refer to two exhaustive volumes on "The History of Brazil from 1808-1831," by John Armitage, Esq., published by Smith, Elder, and Co., 1836.

In 1822 the independence of Brazil was declared, since which time it has been a constitutional empire, ruled over for the last fifty-three years by the amiable, benevolent, and irreproachable Emperor, Dom Pedro II., whom may God long preserve to the country, for whose welfare he is so necessary.

Tramways.

The ubiquitous system of tramways in Rio de Janeiro, and their frequent service of cars, is so excellent that it would be easier to suggest improvement in the means of locomotion which exist in London than in those of Rio. In almost every street or square one meets with the tram-cars of one or more of the four companies, by which one can either proceed from one extremity of the city to the other, or from the centre of the town to the most distant outskirts.

The first line opened in the city was that of the Botanical Gardens Railroad Company, inaugurated at the end of 1868. The trams are always called "bondes," a term I was at a loss to understand till I was informed that the name arose from the simultaneous issue of the bonds of a national loan and the tickets of this company, which latter were used as currency for small payments. This line extends from the Rua do Ouvidor (the Regent Street of Rio) to Laranjeiras, Botafogo, and the Botanical Gardens ; and the total length of rails laid cannot be less than—but may be more than—fifteen miles. The company started with a capital of £40,000, and soon made enormous profits. I heard of one shareholder who, having originally invested £1000, had received in thirteen years between £6000 and £7000 in dividends ; and on the company selling the concern for £750,000, his portion added to his interest

amounted to £24,000! This is the tale that was told me. Money is not made so easily now; but I believe the different companies pay well, and no wonder. They are not hampered by the restrictions of a Board of Trade, and the cost of materials and construction must be a small item in comparison with what it is in England, as the general style appears to be the use of a small flat grooved rail, weighing perhaps twenty pounds to the yard, fixed by screws to longitudinal wooden sleepers. The roads are kept in good repair, except those in the centre of the town, where the paving is in a chronic state of disrepair and full of holes.

The two companies of St. Christovão and Villa Isabel have likewise very extensive systems of main and branch lines from the city towards Tijuca, to the Waterworks; and to the suburbs from which the lines derive their names.

These three companies are all of the broad gauge.

The fourth is the "Carris Urbanos," or City Rails, which has a network of lines of narrow gauge throughout the city, connecting every part of it with the three above-named routes, but not extending into the suburbs. There is also the Sta. Theresa line, worked by the owners of the inclined plane.

The cars are all open, which is most objectionable whenever it rains. They consist of rows of seats, with reversible backs, to which one climbs by a continuous foot-board at each side; a roof keeps off the sun. There are a few close cars, similar to those in use in England; but they are labelled "Descalços e bagagem"—for the use of those without shoes, and for goods. The fare by them is half-price. None of the poorer classes or blacks are admitted into the ordinary cars unless they wear shoes. The line appears drawn at that point; shoes they *must*

have, though they may be clothed in rags. The cars are always drawn by mules of a remarkably good and swift breed. Short distance fares are unknown. Ordinary fare is 200 reis (4*d.*).

Water Supply.

Besides the very important supply from the Aqueduct of the Rio da Carioca, there exist four large reservoirs : that of Dom Pedro II. (which I visited and described), holding 8,800,000 gallons ; that on the Morro da Viuva, 1,386,000 gallons ; that of Rio de Oura, 3,300,000 gallons ; and Sta. Theresa, 660,000 gallons ; and in addition nine smaller reservoirs. There are nine public fountains scattered about the town, all about one hundred years old, or more. These are well frequented by the townsfolk, as also by the carriers who drive about the city with large barrels of water, which they sell for a vintem ($\frac{1}{2}$ *d.*) a bucket. There are also, in course of construction, many ornamental fountains, with large granite basins and statues ; but when I left they were not as yet in use.

Passeio Publico.

This garden I was never tired of visiting. It was opened in 1783, and contains many rare indigenous and exotic trees and plants. For over a hundred years it has been the most agreeable lounge in Rio, and, in my opinion, it surpasses the Jardim Botânico, though the latter is of far greater extent, while it has the advantage of being only a few minutes' walk from the Rua do Ouvidor, in the centre of the city. The garden is covered by the most luxuriant shrubberies, and a tangled mass of very lofty trees, plants, and creepers ; these, meeting overhead, yield a continual shade to the numerous winding walks which intersect the

garden. Many benches scattered beside the walks afford charming resting-places, where one can sit and read, protected from the sun, even on the hottest days. There are also extensive well-kept lawns of the usual knot-grass (*Spergula sp.*), from which spring various solitary palms of many species. A family of pacas (a fawn-coloured rodent, the size of a small pig) and an emu (resembling a cassowary) live in the garden, the latter being very tame, and not objecting to being stroked; while, on various ponds live a number of ducks and geese; and darting among the trees, or lazily floating along the walks, appear many handsome butterflies. At the further end of the garden, bordering the bay, is a fine broad marble-paved terrace, whence is a charming view, and whereon is a drinking fountain, formed by the figure of a boy, who pours water into a stone barrel; beneath the figure is a motto, "Sou util inda brincando" ("I am useful although playing"). This delightful garden is open daily from 6 a.m. At night the walks are lighted with gas. There is also a restaurant; and a German band plays every Tuesday, Thursday, Saturday, and Sunday.

Jardim do Campo da Acclamação.

This is another of the squares worthy of a brief notice. It is much larger than the Passeio Publico, but was only begun in 1873, and opened in 1880, before which time it was a public washing-ground. It is an exceedingly pretty place, with various ponds, islands, and green lawns, and reminded me much of Battersea Park, though, being so new, of course, the vegetation has not yet grown to a great height. Besides its lakes, covered with hundreds of water-fowl, there is in one corner a very picturesque imitation of limestone caves, with waterfall, stalagmites, stalactites, and dripping roof.

The Carnival.

This is well kept up, and lasts for three days, beginning on Quinquagesima Sunday. There are masked balls at all the theatres; every one appears to have taken leave of their senses, and I fear the proceedings are bacchanalian and heathenish. There are processions organized by three carnival clubs—the Fenians, the Democrats, and the Lieutenants of the Devil (*Tenentes do diabo*). Every kind of horse-play is exercised. Numerous mulattos, called *Capoeiros*, dance about and run “amok” with open razors strapped to their hands, with which they rip people up in a playful manner. The police are always on the look-out for these gentlemen, and rush out on them with drawn swords! The carnival taking place in the summer, there is often much rain. I saw one of the comic papers this year, which was sent up to Brumado—the *Revista Illustrada*, a paper which, alas! often turns religion into ridicule. In it were a series of well-drawn sketches of the procession. Amongst them was one depicting it struggling through a surging sea; beneath was the remark that this display resembled the passage of Pharaoh’s host into the Red Sea. The final sketch was a boy kneeling, with a serio-comic expression, grasping a huge codfish, and underneath was written “Lent has begun. We must now welcome the catholic and apostolic bacalháo (salt cod)!” In Brumado, where I was at that time, there was no carnival, and the priest would inevitably have stopped any proceedings which the least bordered on profanity.

Lotteries.

I must not conclude these notes without a word about the public lotteries, which form a very important part of the amusement of the people. They are tolerably frequent.

In June, 1884, for instance, there were "drawings" on the following days : 4, 7, 9, 11, 14, 16, 18, 20, 21, 25, 28, 30 ; *i.e.* about three a week. The highest prize is from 20 to 25 contos (*i.e.*, at 24*d.* to the milreis, £2000 to £2500). There are also varying numbers of prizes of ten, five, four, two, and one conto, of 800, 500, 200, 100, 40 milreis, and from 1800 to 1900 of 20 milreis. The object is the benefit of the province or the town, some hospital or conventual institution, or the fund for emancipation of slaves. I believe a third of the proceeds goes to the cause. The price of a ticket is 20 milreis ; but portions are sold, down to one-twentieth, which costs a milreis. The drawing appears to be done with fairness. I heard of many successful individuals, among them an office-boy, who, buying a milreis ticket, drew a prize of £50 ; and an English captain, who had only that day arrived in Rio, drew a prize of £200 ! The tickets are obtainable at all the kiosks, where coffee and newspapers are sold, also in many shops, while many bureaux exist solely by their sale ; and one cannot walk a hundred yards without seeing little placards floating in the breeze, "Hoje anda a roda"—"To-day the wheel goes,"—or to-morrow, or whatever day it may be. There are also notices stating, "In this office No. — was sold, which drew such a prize." The little newspaper-boys, who cry the evening paper *Gazeta da Tarde*, never weary of calling out "Results of the Lottery." As this happens about three times a week, one soon gets tired of it.

The system may be objected to on account of the gambling it induces ; but the Government upholds it, as it brings much money into their impoverished treasury.

CHAPTER XI.

HOMEWARD BOUND.

July 28, 1884.—The *Valparaiso* steamed off at 5.50 p.m., and our friends accompanied us in the steam launch until it was too dark to see ; then, with a parting, “ Deus guarde as V^{ses}. S^{rias},” we bade adieu to Rio.

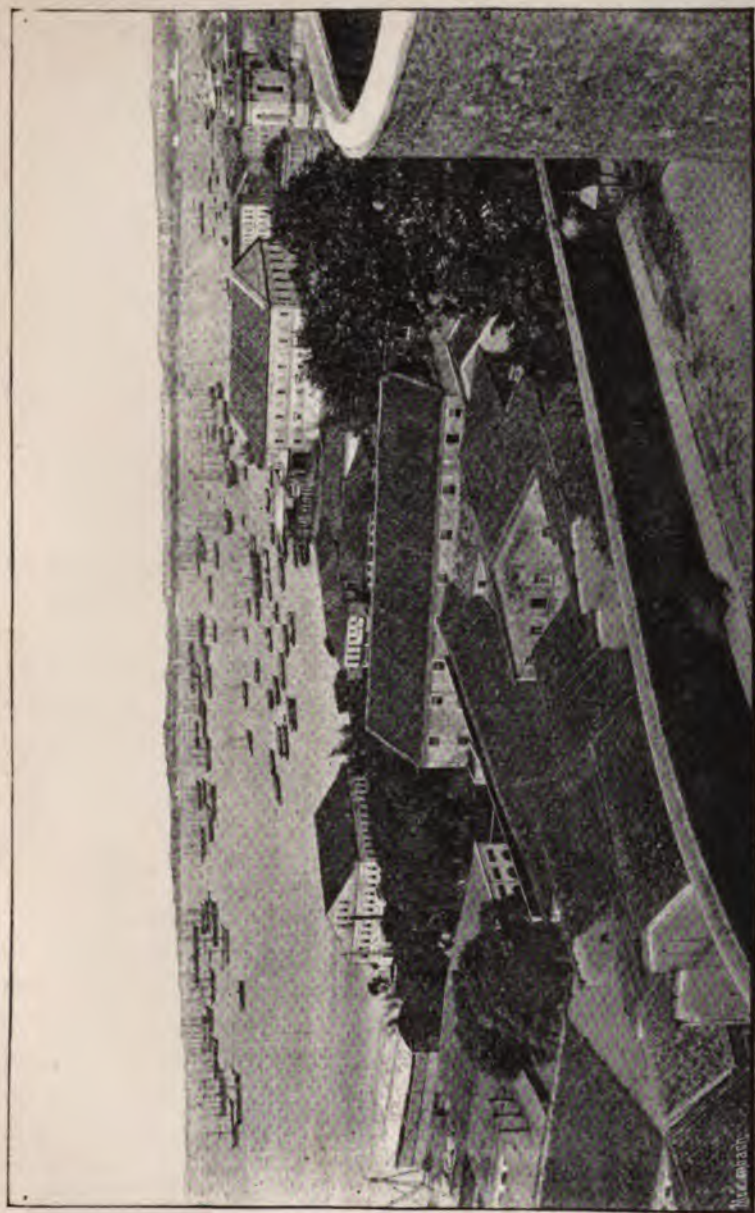
July 30.—I saw a splendid and cloudless sunrise. First appeared a dull red spot on the eastern horizon, which, as swiftly as the wire in the incandescent electric light, became a dazzling white point ; and then the sun rose so quickly that in about two minutes from his first appearance the whole fiery globe was above the horizon. At 8 a.m. we sighted on our port bow the French steamer *La France*, which sailed from Rio three or four hours before us ; we passed her about noon, and lost sight of her astern by 4 p.m. This was the chief amusement to-day, though we caught sight of two whales, and by sunset saw several small chains of hills and mountain peaks.

July 31.—Went on deck at six ; very dull morning. A low line of coast close on the starboard side showed we were approaching Bahia, and by 8.15 we had anchored in the bay. The entrance to this bay is very much wider than that of Rio de Janeiro, and the coast is surrounded by low hills, many of them forest clad. We were, unfortunately,

unable to get a good view of the whole of the bay, which is very extensive; but the various parts of the coast were only visible piecemeal—whenever there was a lull in the heavy showers which, sweeping across the country, came down incessantly till noon.

The city itself is beautifully situated, and consists of an upper and lower town, the means of communication being principally by a lift, or by a well-constructed inclined road, supported throughout most of its length on arches, with a vertical rock face above and below. The principal part of the lower town is commercial, and very dirty and malodorous. High buildings—stores, warehouses, and shops—and narrow streets are the rule, though there are a few respectable thoroughfares.

Walking up the incline we reached the upper town, and there met a tram-car nearly filled with our fellow-passengers from the *Valparaíso*, so joined them, and went out to Vittoria along really good well-paved and wide roads, bordered by neat and sometimes even grand houses in gardens, after the manner of Botafogo; but, alas! we were unable to see any of the lovely scenery from the heights of Vittoria, owing to the torrents of rain. Returning from this suburb to the upper town proper, we came to one or two places where the gradient was so rapid that the mules were taken from the car, and we descended by gravitation, the conductor controlling the speed with his brake; other mules were ready at the foot of the incline to carry us further. I was struck by the very dilapidated appearance of the churches, and at length came to a square called the *Praca do Condé d'Eu*, than which it is impossible to imagine a more broken-down old place. In it are three old churches, and the rest of the buildings consist of tumble-down houses, generally two-storied, with grass and sundry weeds growing



BAHIA, FROM THE ROAD TO THE UPPER TOWN.



promiscuously on roofs and eaves, and sprouting out of a hundred corners and crevices. There is a row of large trees on the four inner sides of the gravelled quadrangle, but the place has "Ichabod" plainly written on it. During the afternoon the rain ceased, and then it *was* hot. We descended into the lower town by one of the numerous very steep and narrow streets, and eventually found our way to the markets.

The sable market-women of Bahia have the reputation of being some of the finest of their stock; but though I saw several fine women, and some of a respectable bulk, I did *not* see any special points of superiority over the dusky beauties of Rio, either in the markets proper or the promiscuous one formed by the continuous row of women with their baskets all along the quay. I was certainly struck at Bahia with the very great preponderance of blacks over whites, but was told that it is called *a cidade dos pretos* (the city of the blacks), and that out of a population of some 230,000 there are only about 50,000 whites. I noticed a peculiar form of Sedan chair made thus: An ordinary wooden-framed cane-bottomed chair with a foot-board is enclosed in a stout frame with a roof; from the roof proceed two long bent poles, which are borne palanquin fashion by negroes; a curtain at each side completes the furniture of this superior hackney carriage. When I saw the elegant machine, it was at rest under a tree, while four attendant blackies were coiled up asleep beside it.

There was a splendid variety of birds and monkeys on sale in the markets; but a good-sized cage with about twenty live toucans (*Ramphastos Ariel*) was, perhaps, the most remarkable object there, and well worth seeing. I invested in two marmosets, which I hope to bring home alive. They are common in the woods round the Corco-

vada, and at the back of our old house at Botafogo; but I never had time even to think of catching any.*

When I was in the market, I noticed the pretty French lady (widow) with her little girl, who had come on our steamer from Chili. We had often remarked that this fair one appeared to have captivated by her charms a fellow-passenger, likewise French; at any rate, there they were together, he busily engaged buying what she asked for. They eventually came on board with half a dozen monkeys and over a dozen birds.

We weighed anchor at 6.45 p.m., the *La France*, which arrived a couple of hours after us, having left at six. I found on inquiry that we had shipped a tolerable cargo of sugar, fibre (for mats, etc.), tobacco, and whale oil, which was stowed away by a number of fine stalwart niggers, mostly bared to the waist.

August 1.—I thought the end was come, being awoken by a few quarts of water dashed into my face; but it was only a little spray, which, concentrated by the ventilator, had come in through the port. The cabin was well wetted.

August 2.—After a roughish and rainy night we reached Recife, or Pernambuco, at 6.30, and anchored a mile outside the natural harbour, which is formed by a reef extending from the mouth of the river along the whole length of the town. There is a lighthouse on the end of the reef, while a breakwater built from the shore leaves a small opening for vessels to enter into the calm harbour. The rough sea prevented my landing, so I could not form an opinion of the town; but many good buildings and churches are to be seen on the flat coast, and the north-east shore

* The monkeys survived through the winter, but their lower limbs gradually became paralyzed, and one died the beginning of June, 1885, the other expiring on Midsummer Day.

extends two or three miles to a hilly and well-wooded point, where stands the Cidade de Olinda ; from that point the flat coast extends to Ceará and Pará (Belem), near the mouth of the Amazons.

I was interested at seeing some rafts, called *jangada* (Port.) or *catamaran*. These are formed of a framework of planks, on which are fixed three or four benches and a mast with a triangular sail, which latter is taken down when the men are fishing. These slight craft can stand any weather, and have been met with two hundred miles out at sea.*

The rough sea caused considerable excitement in the taking on and off of passengers. The company's agent (who had to pay £3 for his boat with six oars to bring him off, though tugged by the company's tender) was hoisted on board in a chair slung from the davits, so were also the three passengers who embarked here. This process was by no means pleasant, as the boats were now alongside, and the next moment swept twenty feet away ; one instant nearly level with the main deck, the next ten feet lower. The greatest excitement, however, was caused by the disembarking of three men and two women into a boat by the ordinary steps. Why they did not go by the ducking-stool, as I called it, I don't know. The boat kept dancing up and down, and one by one the men, taking advantage of a favourable moment, jumped in ; but the women ! it made one hold one's breath. The first tried a dozen times, but always failed. At length, clinging to the hand-rail of the steps, she was just being grasped in the arms of a man at the bows of the boat, when lurch—away went the boat, and she was left hanging over the trough of a wave for a few seconds, which seemed an age ; then back came the boat,

* Small *jangadas* form the only craft allowed on the island of Fernando de Neronha.

and she was caught round the waist. She had just time to cross herself devoutly three times, and then fell into the bottom of the boat almost senseless. This was repeated with the other woman, but at length they all got off safely, and I hope were landed all right, as I heard later of a boat going in to-day with five on board which was upset when rounding the lighthouse ; fortunately another boat was close by, which picked them up before the sharks could get at them.

I spent some time watching the long line of breakers dashing up over the reef, and sometimes nearly to the top of the lighthouse tower, and it looked so curious through the spray to see the calm water beyond. We tried shark-fishing ; but though we saw several pilot-fish, and the bait was nibbled, Johnny Shark was too wary for the hook. Sometimes when a bullock has been killed here and the waste portions thrown overboard, four or five sharks have rushed at the dainty morsel.

Before we had been at anchor an hour, eight boats came out, and soon there was a regular market forwards ; cages, bags, and baskets had been brought up, and there was a fine display of pineapples, oranges, cocoa-nuts, sugar-canes, ocelot skins, about one hundred parrots, three kinds of paroquets, lots of marmosets, and a coati. The vendors, who knew how to charge, talked Spanish, French, English, and Brazilian, and were willing to take all these moneys, as well as those of the West Coast republics.

I was told by a ten-years' resident (who joined us here) that sugar is the principal export ; cocoa-nut trees abound ; tobacco is grown principally for home consumption, though a little is sent to Rio ; but there is no coffee. There are very pretty drives in the neighbourhood. Pernambuco is the healthiest place on the coast ; there has been no yellow

fever there for eight years. Ceará is also pretty good ; but Pará, Natal, and Maranhão are each more unhealthy than the other.

Pernambuco is the most northerly point in Brazil where the telephone is in use.

Brazil nuts (so well known in England) are imported from Para. The cost there is four milreis per one hundred nuts, each of which contains seventy to eighty of the small nuts ; and it is often a *plaisanterie* to give a stranger one of these large nuts, and promise him so much if he can take all the little nuts out and replace them again. It is said to be impossible.

We left Pernambuco at 1.30 p.m. in drenching rain, the rainy season in this part being from May to the end of August ; but it sometimes begins in March, or even in February.

August 3.—Fernando de Neronha in sight from eleven to four.

August 4.—Crossed the line about 5.15 a.m.

August 7.—The sun was vertical to-day at noon, the hottest day of the voyage, although we are in lat. 14° N. Both my monkeys escaped to-day. Several of us who have parrots or wee beasties are in the habit of spending much time with them and taming them. I had one monkey to-day on deck, secured by a long bit of tape ; by accident I let go, and off he rushed. I feared he would go up the rigging, or jump overboard. Half a dozen men were soon in pursuit, and he was captured. Five minutes later came the news that my other monkey had escaped. I went down and found him comfortably ensconced on the main deck, near the fore hatchways, behind a lot of bags containing a few tons of potatoes, etc. There was no forcing him out ; I had simply to sit and watch—only for two hours and a

half. At last he was allured out by a banana, and then, finding I had shut off his retreat, he dashed down the passage leading to the saloon, where he was caught.

August 8.—Woke at six, slowing down. Lying in my bunk, I could see close to starboard the bare and wondrous looking rocks of St. Vincent. Going on deck, I saw the *La France* already coaling. At 7.15 the *Ruby* brought us our first lighters of coal, and the dirty work began, the first sack being shot into the spout with the remark, "One, as the devil said when he had the parson." Meanwhile the custom-house officers came alongside, and, though we had a clean bill of health, quarantined us for coming from Brazil, and set a boat with three dusky youths in it to row round about us with a yellow flag flying; no one was, therefore, allowed to go on shore, and the agent not permitted on board.

Two or three boats came off with some very expensive shells, a couple of monkeys (from Africa, *only* £1 each), some very pretty little paroquets (green, with red cheeks), a few bananas, grass mats, baskets, and some poor specimens of inlaid woods; but the vendors did not have much custom. There were also two boys who dived pretty well for sixpences, and swam under the ship nearly amidships for 1s. 6d. They kept continually shouting, "Atira prata" ("Throw out some silver"), and I think got about 10s. between them. The steward bought two large pails full of fish from a fisherman, certainly a wonderful and beautiful variety in shape and size and colouring. They charmed me as a naturalist, and I wish I could have had a ichthyological friend to name them.*

The little white-housed town of St. Vincent lies in a

* The price was eight pieces of eight, or Peruvian soft dollars, value 3s. 4d. each.

hollow among hillocks, surrounded by sandy plains and bare rugged mountains, with range beyond range of jagged crags and precipices. The island has certainly a most extraordinary mountain-in-the-moon-like look; there was only one little patch of green on a plain near the town, while some way off, in the midst of a flat sandy waste, is seen the lazaretto at the foot of another gaunt range. Half a dozen passengers came on here, mostly connected with the Telegraph Construction and Maintenance Co., and some rock specimens which one of these gentlemen showed me were certainly volcanic; but, looking at the mountains from the bay, there appear the strongest evidences of stratification.

The neighbouring island of São Antonio, which appears but a stone's throw, owing to its lofty mountains, is fertile, but has very few inhabitants. From thence come the fruit, etc., and also all the water, not only for the supply of the steamers, but even for the town of St. Vincent. The water is brought over the straits in lighters, and sold at one penny per gallon. One ship lately had to pay £10 for 1600 gallons.

At length, when everybody and everything is black with coal-dust, at noon, we weigh anchor, leaving the *La France* behind to see her no more, as she is bound for the Mediterranean, and won't catch us up. We take a last look at the curious bay, and at the German steamer sunk in a collision here some time ago (all we can see is half her masts sticking out of the water, though I believe she is to be raised), and then glide away past the picturesque lighthouse, which is placed at the top of a rock about the middle of the bay. The log registered ten miles' run when we passed the end of São Antonio, yet the height of the mountains and the clearness of the atmo-

sphere made it appear as if we had not done half that distance. The Cape Verd group includes seven named islands: S. Antonio, S. Nicolas, Sal, Boa Vista, Maio, Santiago, and Fogo, besides other smaller ones. They occupy a space of 150 miles north to south, and 180 miles east to west.

August 10.—Crossed the Tropic of Cancer (one year and fifty-five days in the tropics). Saw large shoal of porpoises.

August 11.—Saw the top of Teneriffe above masses of clouds at 12.30 p.m. At 3.30, just after passing the south end of the island, we sighted a French steamer close in shore, and watched her, as she seemed to be making no progress; at length, when we came abreast of her, and perhaps three miles off, she ran up the tricolour and signals. We ported helm, made towards her, and then spoke to her. She signalled, "In distress; engines broken down." We answered, "Do you want help?" She replied, "Whither are you bound?" We retorted by asking her name, and she did not give it, but politely saluted us by lowering her flag three times, and so we parted. The captain saw it was all straight, and that, being at anchor and to windward of the island, there was no fear. This little adventure gave us the advantage of getting close in to the shore, so that we were able to distinguish two considerable villages, and two or three fazendas nestled on the hillside, although they were some five miles off. The lofty and lengthy outline of the range, which slopes up gradually from the sea, reminded me somewhat of the view of the Glydrs, as seen from the road between Pen-y-gwryd and Capel Curig, only supposing the high-road to be the shore, and the slopes up to the Glydrs to be seven thousand to nine thousand feet instead of one thousand

to twelve hundred feet. By 7.45 we passed the lighthouse at the north end of Canaria, and now go forth into a stormy, pitchy-dark atmosphere towards Europe, which will be the next land we see.

I noticed in Rio de Janeiro advertisements for emigrants required to go to the Canary Islands. This really seemed to me too good a joke, to ask a country with three or four people to the square mile to send off emigrants. I know nothing about the place and its productions, except a certain old-fashioned canary wine, which is to be got in Brazil, and is called Canary Indian wine, because from the Canaries it makes a voyage to the East Indies and then to England, from whence it is sent to Brazil.

August 14.—Caught the first sight of the Portuguese coast at 10.30; by midday the Cintra Hills stood out in great distinctness, and we were soon amidst numerous fishing-smacks, with the charming shoulder-of-mutton sails, besides two or three wonderful minute and incomprehensible triangular sails on the bowsprit and aft.

We anchored over Belem in the quarantine roads at 2.30, outside the harbour and town proper. It was just such a day as when we landed in Lisbon on the 12th of June last year; but now we have the ominous yellow flag, denoting quarantine, flying from the foremast.

The official boat came off, threw some papers on board, received ours in the same way, and then sheered off to examine them. We were, of course, quarantined, which is the rule coming from Brazil, two gendarmes being sent on board to watch us.

Coaling soon began, as we had only taken two hundred tons at St. Vincent; but this time the coal was brought up in baskets from the lighters, and pitched direct into the bunker's down-shoots in the ship's sides, so there was

much less dust. Then a few second and third class passengers went off to the lazaretto for eight days—happy beings!—before being allowed to mix with the world. The lazaretto is on the south side of the Tagus, a group of fine-looking houses, pleasantly situated on high ground; but I'd rather not be compelled to visit it. We were informed that a quarantine of five days is for the present imposed on all vessels from England, owing to a reported outbreak of cholera at Liverpool.

For five hours we were compelled to stay here, much annoyed at the ridiculous prohibition against going ashore, as there was no yellow fever at Rio when we left, and we had been out seventeen days without illness on board. At length, when a beautiful sunset was bathing the town and villages with a thousand warm tints, and forming even a prettier picture than we had seen by day, we weighed anchor and left for Pauillac.

August 16.—During the night, when entering the Bay of Biscay, we got into a belt of fog, so slowed down, and the fog-horn sounded for two hours, much to the comfort (?) of the passengers.

The Bay of Biscay is smooth as oil.

Two little birds, something like wrens, only with white breasts, have been flying about the ship and settling on the railings or boats ever since last night. A good many small moths, apparently *Pyralides*, were flying about the deck this evening; yet we are out of sight of land.

August 17.—Entered the Gironde at 8, and raced two steamers (Swedish and Dutch) up to Pauillac, where we anchored at midday. The officials, after shaking some disinfecting powder over our papers, examined them, and did *not* put us in quarantine.

Several of our fellow-passengers left here, including the

charming French widow. The moment she got on the tender, she found two of her monkeys (in a box by themselves) had escaped, or had been stolen. I believe some one had played a practical joke on the Frenchman, who had bought them for her; at any rate, he rushed about, stormed and raged, tore back to the ship, smashed his hat in against the side of the door, which made him worse, and at length, returning after an unsuccessful hunt, shook his fist at the ship, and, red with fury—and the sun—with his eyes starting from his head, yelled out that everybody on board, from the captain downwards, was a blackguard.

Having seen a little of Bordeaux last June, I wished this time to visit Pauillac, so went there with a number of others, stopping first for refreshments at the Grand Hotel, where we ordered a small omnibus to drive round. We then split up into two or three parties, and I went with the omnibus. Such a change after Brazil! Here all is cultivation and houses and roads—not an inch wasted. We drove along a good road through endless vineyards and a neat village up to Château Lafitte, approaching it by a fine avenue of poplars and other trees. The château is in the usual style of French châteaux, with round towers and pointed roofs, and has a charming old-fashioned garden full of flowers. I was really delighted at the cozy look of the place; so also was an elderly English gentleman* who was with me, and had been thirty-one years in Brazil without returning to Europe. He appeared immensely smitten, and remarked constantly on the cultivation and quiet beauty of the place and neighbourhood, and the cleanliness of the town, villages, and houses. We were unable to see the internal economy of the château and preparation of

* The late Mr. William Morritt, of Petropolis. He died at sea on board the *Galicia*, on his return journey to Brazil, January 29, 1885.

wine, as all the men were away ; so we went to a vineyard just opposite, called Château Rolland, where we were most hospitably entertained by the proprietor. We first visited the cellars under the house, and he got out some bottles of wine ; then we adjourned upstairs to the kitchen, but the good wife insisted on our going into the parlour. Some of the wine was certainly first-rate (1875 vintage), but of that there was none for sale ; and I did not much care for the 1880 vintage, though mine host said he had sent twenty barrels of it this year to the chamberlain of the King of Sweden, whose photograph he showed us, and who is an excellent customer. His price was 450 francs for a barrel of three hundred bottles, including corks, labels, and bottles. The good man had lately returned from Australia, where he had been for his health ; and, after a three-years' stay, returned quite set up. He certainly looked stout and hale and hearty. But I was quite distressed that, after drinking half a dozen bottles of his wine, besides biscuits, he refused any payment. We then returned to our hotel for dinner at four. Afterwards we strolled about the town ; I bought a Basque cap, and my companion some *sabots* for gardening. The houses and shops are all built of, or at least faced with, a stone which appeared to me a kind of oolitic limestone ; this gives an exceedingly clean look to the town. It was a great treat to see so many pretty, smiling, rosy-cheeked lasses, with their neat caps or gay handkerchiefs, after a year without looking on a healthy colour, except in the Germans of Petropolis. Going off by the 7.30 boat, we left our anchorage about ten.

August 18.—The Bay of Biscay still like oil. Off Bel Île at midday, and Ushant at 10 p.m.

August 19.—Off the English coast at 6 a.m. The ship rolled a great deal all day—much more motion than we

have had since we left Rio. At 7.30 p.m. we saw the Wicklow Hills against the crimson sky.

August 20.—Woke about five. We were waiting outside the bar of the Mersey; in the course of half an hour, a dozen steamers and other vessels were round us, all waiting like ourselves. The Welsh coast looked charming in the early dawn. At length, by 7.30, we had passed New Brighton, and the tender came alongside. Above us the sky was clear; but there was a horrid smoky fog hanging over Liverpool and Birkenhead like a pall, which was depressing after returning from a land where, whatever disagreeables there may be, there is, at least, no sulphurous obscurity. We had yet to undergo something before putting our foot on English soil, *i.e.* the Custom House. Two long hours were spent in that shed on the landing-stage, while every box and package was opened, and thoroughly ransacked for dynamite. My geological specimens were looked at somewhat, but a case of guava marmalade was *pounced* on. "It's jest the colour of dynamite," says one customs officer, who must needs taste it to convince himself it was *not* that dreaded compound.

We are once more at home. No more remains to be told. So I must wind up this part of my journal and proceed to the other portion, which, though perhaps not light reading, may be, or at least I consider it to be, more important, though I can hardly hope that all who have waded through my daily experiences will read on to the end of the book.

However, before I close I must express my grateful thanks—and I know that I should herein be joined by all our staff did they know what I am writing—to Captain Hayes of the *Cotopaxi*, Captain Friend of the *Valparaiso*, and all their officers, for their unvarying kindness and

sociability. It is not everywhere that such captains and such officers are to be met with ; and I hope that, should these lines ever meet their eyes, they will accept our heartfelt thanks for the many pleasant hours they have allowed us to spend in their company—hours which for many a day it will be a delight to remember.

NOTE TO PAGE 244, LINE 33.

The Reef off Pernambuco.

Mr. Charles Darwin, in his book "The Structure and Distribution of Coral Reefs," has a special note (p. 266, 2nd edition) on the "Remarkable Bar of Sandstone off Pernambuco" (originally published in the *Philosophical Magazine*, October, 1841). He says it is a "smooth level-topped ridge, from thirty to sixty yards in width, with even sides, and extending in a *perfectly* straight line for several miles parallel to the shore." It is for the most part composed of sandstone and conglomerate, and is *not* a coral reef.

OUTWARD PASSAGE.

LIVERPOOL TO RIO DE JANEIRO R.M.SS. *COTOPAXI*.

SAILED JUNE 6, 1883,

12.30 p.m.

DATE.	HOUR.	LAT.	LONG.	DISTANCE MADE.	COURSE MADE.	REMARKS.
June 6.	12.30 p.m.	53° 24' N.	2° 59' W.	.....	.....	Left Liverpool.
" 7.	noon	49° 51' N.	5° 44' W.	284 miles	various	To Pauillac 362 miles.
" 8.	"	46° 2' N.	1° 49' W.	292 "	"	" 70 "
" 8.	5.45 p.m.	45° 13' N.	0° 43' W.	70 "	"	At Pauillac.
" 9.	4 p.m.	.....	.....	.....	.....	Left Pauillac.
" 10.	noon	44° 47' N.	5° 41' W.	237 "	various	To Carril 236 miles.
" 11.	8.30 a.m. to 10	.....	.....	263 "	"	At Carril.
" 11.	1.30 p.m. to 3.30	42° 14' N.	8° 44' W.	40 "	"	At Vigo.
" 12.	12 to 6.45 p.m.	38° 42' N.	9° 8' W.	240 "	"	At Lisbon.
" 13.	noon	35° 49' N.	11° 31' W.	210 "	"	To Rio de Janeiro } 4016 miles.
" 14.	"	31° 26' N.	14° 9' W.	294 "	S. 27° W.	" 3722 "
Passed between the Canary Islands.						
" 15.	"	27° 7' N.	16° 45' W.	292 "	S. 28° W.	" 3430 "
" 16.	"	22° 46' N.	18° 18' W.	284 "	S. 23° W.	" 3146 "
" 17.	"	18° 26' N.	21° 0' W.	288 "	S. 26° W.	" 2858 "
" 18.	"	14° 13' N.	23° 25' W.	288 "	S. 29° W.	" 2570 "
Passed to East of Cape Verd Islands.						
" 19.	"	9° 56' N.	25° 30' W.	284 "	S. 25° 36' W.	" 2286 "
" 20.	"	5° 40' N.	27° 35' W.	284 "	S. 26° W.	" 2002 "
" 21.	"	1° 27' N.	29° 9' W.	270 "	S. 20° W.	" 1732 "
Passed the St. Paul's Rocks.						
" 22.	"	2° 33' S.	32° 10' W.	300 "	S. 37° W.	" 1432 "
Current set the ship N. 76° W. 33 miles. Passed Fernando de Neronha.						
" 23.	noon	6° 50' S.	33° 48' W.	275 "	S. 20° W.	" 1157 "
" 24.	"	11° 13' S.	35° 9' W.	274 "	S. 164° W.	" 883 "
" 25.	"	15° 49' S.	37° 13' W.	295 "	S. 231° W.	" 588 "
" 26.	"	20° 19' S.	39° 30' W.	300 "	S. 26° W.	" 288 "
" 27.	10.30 a.m.	22° 54' S.	43° 20' W.	288 "	... ..	Arrived at Rio de Janeiro.

Liverpool to Pauillac	...	...	646 miles in 2 days 5 hours 15 minutes.
Pauillac to Carril	...	...	500 " 1 " 16 " 30 "
Carril to Vigo	...	...	40 " 0 " 3 " 30 "
Vigo to Lisbon	...	...	240 " 0 " 20 " 30 "
Lisbon to Rio de Janeiro	...	...	4226 " 14 " 15 " 45 "
Stoppages	...	...	5652 " 19 " 13 " 30 "
Total	...	...	20 " 22 " 0 "

RETURN PASSAGE.

RIO DE JANEIRO TO LIVERPOOL PER R.M.SS.
VALPARAISO.

SAILED JULY 28, 1884,

5.50 p.m.

DATE.	HOOR.	LAT.	LONG.	DISTANCE MADE.	COURSE MADE.	REMARKS.
July 28.	5.50 p.m.	22° 54' S.	43° 20' W.	.....	.....	Left Rio de Janeiro.
" 29.	noon	21° 44' S.	40° 5' W.	202 miles	various	546 miles to Bahia.
" 30.	"	17° 9' S.	38° 26' W.	294 "	"	252 "
" 31.	8.15 a.m. to 6.45	15° 57' S.	36° 27' W.	252 "	"	At Bahia.
Aug. 1.	noon	10° 58' S.	36° 31' W.	196 "	"	210 miles to Pernambuco.
" 2.	6.30 a.m. to 1.30	8° 3' S.	34° 51' W.	210 "	"	At Pernambuco.
" 3.	noon	4° 4' S.	33° 0' W.	268 "	"	To St. Vincent } 1346 m. { N. Vincent } 21° E.
Passed Fernando de Neronha.						
" 4.	"	0° 27' N.	30° 53' W.	299 "	N. 25° E.	" 1046 " { N. " 20° E.
" 5.	"	5° 10' N.	29° 19' W.	298 "	N. 19° E.	" 748 " { N. " 19° E.
" 6.	"	9° 50' N.	27° 26' W.	302 "	N. 22° E.	" 444 " { N. " 19° E.
" 7.	"	14° 0' N.	25° 56' W.	274 "	N. 19° E.	" 171 " { N. " 18° E.
" 8.	6 a.m. to 12.30	17° 0' N.	24° 0' W.	171 "	.....	{ At St. Vincent, Cape Verd Islands.
" 9.	noon	20° 0' N.	22° 44' W.	235 "	N. 34° E.	To Lisbon } 1327 m. { course " var.
" 10.	"	23° 47' N.	20° 11' W.	261 "	N. 33° E.	" 1066 " "
" 11.	"	27° 21' N.	17° 18' W.	265 "	N. 36° E.	" 801 " "
" 12.	"	30° 50' N.	14° 41' W.	252 "	various	" 548 " "
" 13.	"	34° 39' N.	12° 16' W.	259 "	N. 28° E.	" 288 " "
" 14.	"	38° 23' N.	9° 44' W.	253 "	N. 28° E.	" 27 " "
" 14.	2.30 p.m. to 7.45	38° 42' N.	9° 8' W.	27 "	.....	At Lisbon.
" 15.	noon	41° 15' N.	9° 35' W.	172 "	various	To Pau-illac } 543 " "
" 16.	"	44° 22' N.	6° 15' W.	269 "	"	" 274 " "
" 17.	11 a.m. to 10	45° 13' N.	0° 43' W.	274 "	.....	At Pauillac.
" 18.	noon	46° 56' N.	3° 9' W.	150 "	various	To Liver- pool } 496 " "
" 19.	"	50° 59' N.	5° 54' W.	279 "	"	" 217 " "
" 20.	8 a.m.	53° 24' N.	2° 59' W.	217 "	"	Arrived at Liverpool.

Rio de Janeiro to Bahia	...	...	748 miles in	2 days 14 hours 25 minutes.
Bahia to Pernambuco	...	...	406 "	1 " 9 " 45 "
Pernambuco to St. Vincent	...	...	1612 "	5 " 16 " 30 "
St. Vincent to Lisbon	...	...	1552 "	7 " 2 " 0 "
Lisbon to Pauillac	...	...	713 "	2 " 14 " 15 "
Pauillac to Liverpool	...	...	646 "	2 " 10 " 0 "

	5779	21	18	55
Stoppages	...	1	16	15
Total	...	23	11	10

APPENDIX I.



NOTES ON THE PROVINCE OF MINAS GERAES.*

"OWING to its central position, the province of Minas Geraes continued for a long time unpeopled by others than natives.

"In the sixteenth century, Sebastian Tourinho and Antonio Dias Adorno arrived in the province by following up the riverbanks. Latter in the same century, Marcos de Azeredo Coutinho reached it, starting from Espirito Santo.

"It was not, however, till the end of the seventeenth and beginning of the last century that adventurers, principally from Bahia and São Paolo, some descending by the Parahyba, and others by the São Francisco, explored this immense territory, being first attracted by the ambition of enslaving Indians, and then by the abundant mineral riches which gave its name to the province.

"At first the territory formed part of São Paolo, Rio de Janeiro, or even of Bahia, according to the part in which each of the explorers lived.

"By the arrangement of the Conselho Ultramarino of September 23, 1709, it was united to São Paolo, and was with that province raised to the position of a chief state. By another provision of December 2, 1720, it was separated from São Paolo, and raised to be an independant chief state. Its first governor was Dom Lourenço de Almeida, who took possession August 28, 1721.

* Partly translated from "Apontamentos para a Geographia da Provincia de Minas Geraes." H. Laemmert e Ca., Rio de Janeiro, 1883.

"The early period of its existence was extremely agitated. The rivalries of race assumed a serious character, and produced the sanguinary scenes known by the name of the wars of the Emboabas. The fiscal rights of the metropolis, the repeated laws made to raise the taxes (not tithes, but fifths), the different forms of taxation, were also the origin of disturbances which many times ended tragically on the scaffold.

"The closing years of the last century were saddened by the conspiracy of Tiradentes; in which, generous plans and imprudent words brought to the gallows that heroic patriot, and led to the banishment of so many men of distinction.

"The attempted conspiracy of Tiradentes—for it did not reach beyond an attempt—was the last threatening of the people of Minas during the colonial period. Since then peace, quietness, and contentment have been established there, and it was only in 1842 that a revolutionary movement broke out, which was promptly nipped in the bud.

"Minas Geraes is to-day one of the most peaceful provinces in Brazil, besides having the largest population; and, following the example which the country has set it, since, in 1850, the period of revolutions came to an end, it has begun by agriculture and industry to augment its importance, and lay the foundation of its progress."

It is the fourth largest of the twenty provinces which form the Empire of Brazil, the other three being Amazonas, Pará, and Mato Grosso.

Minas Geraes extends in length from 14° to 20° S. lat., and in breadth from 3° 24' east to 8° west of Rio de Janeiro; it has, therefore, an extreme length of 621 miles, and breadth of 786, with an area of 888,600 square kilometres. Thus it is larger than the British Isles and France together, the British Isles being 300,000 and France 543,000 square kilometres respectively.

It is the most mountainous province in Brazil, and is crossed by two principal groups of ranges.

The Espinhaço group, which, branching out of the Serra do Mar in São Paulo, extends as far as the heights of Barbacena, under the name of Serra da Mantiqueira, and thence turning northwards reaches to Diamantina, whence it passes into Bahia.

The second group is the Vertentes (or watershed), extending approximately from east to west, and passing into Goyaz.

The group of the Serra do Espinhaço includes four ranges and fourteen series of ramifications of mountains. Speaking broadly, it starts on the boundary of São Paulo, thence passing towards Barbacena, near which it is joined by the Vertentes group; it divides the tributaries of the Parahyba do Sul from those of the Rio Grande, whence, running north, it is the great boundary between the São Francisco, whose tributaries flow off to the west, and the Rios Dôce, Jequitinhonha, and Pardo, which, flowing east, pass into Espírito Santo and Bahia.

The group of the Serra dos Vertentes includes four ranges and eleven series of ramifications. This group is the great divide, separating all the waters flowing west or south into the Paraná from the rivers going east or north into the São Francisco.

The province is watered by seven principal rivers—São Francisco, Paraná or Rio Grande, Dôce, Jequitinhonha, Parahyba, Pardo, and Mucury.

According to Gerber, the following is the distribution of the watersheds of the province.

	sq. leguas.	sq. kilom.
São Francisco	8,800 ...	390,98 ;
Paraná or Rio Grande	4,900 ...	217,707
Parahyba	700 ...	31,101
Itabapoana	80 ...	3,554
Dôce	2,300 ...	102,189
S. Matheus	100 ...	4,443
Mucury	400 ...	17,772
Different rivers emptying into the sea between		
Porto Seguro and Porto Alegre	100 ...	4,443
Jequitinhonha	2,200 ...	97,746
Pardo	420 ...	18,661
	20,000 ...	888,600

The Rio Grande or Paraná is one of the confluent of the River Plate. After a course of 205 leagues from its source, it is joined by the Parahyba, taking then the name of Paraná.

It is not navigable for a great part of its course, owing to rapids.

The Rio São Francisco is the third longest river in Brazil, and

ranks sixteenth in the great rivers of the world. It is only surpassed in Europe by the Volga. Rising on the north side of the watershed of the great central plateau of Minas Geraes, in the Serra da Canastra, a part of the Vertentes range between 20° and 21° S. lat., it flows south to north, as do also its tributaries, Pará, Paraopéba, and Rio das Velhas, which latter it receives S. lat. $17^{\circ} 11' 54''$, long. $1^{\circ} 43' 35''$ west of Rio de Janeiro. After a course of 187 leagues, or 748 miles, the São Francisco enters the province of Bahia; thence it flows, through the provinces of Pernambuco, Sergipe, and Alagoas, 950 miles, to the wonderful falls of Paulo Affonso, and, after another 150 miles, empties itself into the Atlantic Ocean at Penedo, at about $10\frac{1}{2}^{\circ}$ S. lat.*

Its principal affluents in the province of Minas are nine rivers on the left bank; and the rivers Pará, Paraopéba, Rio das Velhas, Jequetahy, Mangahy, and Verde Grande on the right.

The Jequitinhonha rises in the Serra do Espinhaço, near Diamantina, and flows 130 miles north-east, then easterly and south-easterly, finally north-easterly to the sea. At the extreme north-east corner of Minas is a magnificent series of falls some three hundred feet high, thence its course is through the plains.†

The Rio Dôce rises in the Mantiquiera range, and, after a very circuitous course, enters Espirito Santo.

The province of Minas is supposed to be one of the most industrious in Brazil. Most of the coffee known as Rio coffee is grown here, and the tobacco from Barbacena, Pomba, and Baependy is celebrated in Rio. The principal other exports that I saw are rum, rice, black beans, sugar, cotton, charcoal, hides, salt pork, farinha de mandioca, maize, maize flour, cheese, and tapioca.

THE MINES.

Captain Burton has written ‡ so exhaustively on the gold mines that it would be presumptuous for me to say more than a passing word about them, especially as my work unfortunately prevented my visiting the mining districts, although I was within

* "Hydrographie du Haut San Francisco, et du Rio das Velhas," Emmanuel Liáis, Paris, 1865.

† Hartt's "Geology and Physical Geography of Brazil," p. 137.

‡ "The Highlands of Brazil," 1869.

fifty miles of Ouro Preto. The first diamonds were found at Diamantina, in 1729, and the famous Portugal crown diamond came from this locality in Minas Geraes.*

Mining to-day has not the importance it had a hundred years ago. Dr. Chrispiniano Soares says, "Gold is done for to the black population and to the old proprietors of works, who, ignorant of the great progress of science and the art of working mines, find themselves incapable of extracting the riches that exist. The proof is that, in 1879, four mining companies, regularly equipped, but without all the appliances that might be, extracted 483,606 oitavas of gold; whereas in 1814, seventy-nine proprietors of works in the very rich municipality of Ouro Preto obtained only 30,815 oitavas." He concludes, "The province of Minas is a vast and superb territory, which, yet in its youth, presents itself for the great industry of the extraction of gold. . . . The not far distant future will produce enterprising spirits, new companies will be organized, and I piously believe that this beautiful province will astonish the world by verifying what I anticipate in reference to its long-delayed prosperity." †

Captain Burton lays the whole onus of the want of success of mining companies to their being mere bogus concerns, started for no other reason than swindling, and says, "The most lamentable result is the false conviction in Europe that the seed of capital cannot be sown profitably in Brazil, when there is no country where, properly husbanded, it would bear a better crop." ‡

M. Emmanuel Liais, at the close of a very elaborate description of the geological and mineralogical features of the country, remarks, "At present the working of mines in Brazil is almost entirely limited to gold and diamonds, and to some of those stones which accompany the latter and are found in the same beds, such as yellow topazes, chrysoberyls, beryls or aqua-marines, and certain green tourmalines called also Brazilian emeralds. The high prices of these substances make their search possible in the interior of the empire, but the absence of roads permitting cheap

* "Brazil, its Provinces and Chief Cities," etc., Wm. Scully. Trübner, 1872.

† "Revista da Engenharia," February 28, 1883.

‡ "The Highlands of Brazil," vol. i. p. 218.

gold fields of that country would not be neglected by American capitalists." *

REPRESENTATION.

The province elects ten senators, twenty general deputies, and forty provincial deputies. By the returns of 1881 the province contains 24,141 electors. There are 87 municipal chambers and 139 districts, with twenty electoral districts, containing in all 482 parishes. Some of the names of these parishes are so remarkable that I translate a few :—

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 " " " do Campo Místico.
 " " " de Mattosinhos.
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 Espirito Santo dos Coqueiros.
 " da Forquilha.
 Nossa Senhora Madre de Deus do Angú.
 " Patrocinio da Marmelada.
 " da Meia Pataca.
 " Conceição do Laranjal.
 " das Dôres do Monte Alegre.
 " da Assumpção do Chapeo d'Uvas.
 " Abbadia do Porto Real de S. Francisco.
 " Consolação de Capivary.
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 " do Bom Conselho dos Serranos.
 " Aparecida da Estiva.
 " do Rosario da Pimenta.
 " Mãe dos Homens de Bagagem.
 " " de Turvo.
 " dos Prazeres do Milho Verde.
 " das Necessidades do Rio do Peixe.
 " da Cachoeira do Brumado.
 " do Rosario do Sumidouro.
 " da Conceição de Catas Altas do Matto Dentro.
 " das Raposas.
 " da Boa Viagem do Curral d'El-Rei.
 " da Venda Nova.
 Santa Anna de Capivary.
 Santo Antonio da Olaria.
 Santa Barbara do Monte Verde.

* Hartt's "Geology and Physical Geography of Brazil," p. 546.

transport in general prohibit the working of most of the other minerals, notably iron (which in Brazil is so abundant), lead, and copper." * Regarding iron, Professor Gorceix says † there are one hundred and ten ironworks in Minas, producing three thousand tons annually—not a very large amount.

M. Liais refers especially to the enormous number of auriferous veins which abound in Minas and in the neighbourhood of Pitanguy, and insists on the choice of pyritic veins for further working. "The chief question is to reduce economically a large quantity of the matrix; for if the yield per cubic metre be not so great as from certain veins in California and Australia, the volume is incomparably greater, which well compensates that inconvenience. The use of hydraulic motors should be preferred to all others, as being the most economical. These can be utilized also for compressing air. By using them, a yield of five grammes of gold per cubic metre pays the cost of extracting a pyritic vein, except at very great depths; and experience shows that most veins yield double this quantity at the outcrop, sometimes more; and generally eight or ten times as much at a small depth. There are still a number of mines unexplored, where streams exist sufficient for large works. These are the most valuable. . . . But never, in Minas Geraes at least, need one go far from the mine to find streams capable of supplying a great motive power. In conclusion, no failure has ever yet occurred in the gold mines of Brazil, but through carelessness of administration, bad direction of the works, and absence of a proper study of the dip of the veins." Any who are interested in knowing more about the subject I would recommend to read M. Liais's and Captain Burton's books, which enter exhaustively into the matter from different points of view. I will conclude this short note on the mines with one more extract. "The generally received opinion that the gold mines of Brazil are exhausted is a very great mistake. There are still surface deposits of great extent which, with modern appliances, could be successfully worked. The underground wealth of the country is almost untouched, and if the mining public of America knew Brazil better, I am persuaded that the

* "Climats, Géologie, etc., du Bresil," pp. 291, etc.

† "Revista Brasileira," vol. v.

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* Hartt's "Geology and Physical Geography of Brazil," p. 546.

Santo Francisco de Assis do Capivara.
 „ Sebastião da Cachoeira Alegre.
 „ „ dos Lenções.
 „ Francisco das Chagas do Monte Alegre.
 „ Gonçalo de Catas Altas de Noruega.
 Barra do Espirito Santo.
 Almas da Barra do Rio das Velhas.

Translation.

The Good Lord Jesus of the Dark River.
 „ „ „ Open Fields.
 „ „ „ Small Bushes.
 The Three Hearts of Jesus.
 The Holy Ghost of the Cocoa-nut Tree.
 „ „ Pitchfork.
 Our Lady Mother of God of Porridge.
 „ Patroness of Marmalade.
 „ of Fourpence.
 „ Conception of the Orange Garden.
 „ Sorrows of the Joyful Mountain.
 „ Assumption of the Hat of Grapes.
 „ „ „ Abbey of the Royal Gate of S. Francis.
 „ Consolation of the Water-hog.
 „ Conception of the Green River.
 „ Good Council of the People of the Hills.
 „ who appeared as the Trimmer of a Ship.
 „ of the Rosary of the Pepper Tree.
 „ the Mother of Porters.
 „ „ the Men of Mud.
 „ of Pleasure of Green Corn.
 „ Necessities of the River of Fish.
 „ the Rapids of the Foggy Place.
 „ the Rosary of the Gutter Sink.
 „ Conception of the High View of the Backwoods.
 „ the Foxes.
 „ the Good Voyage of the King's Pigsty.
 „ the New Grog-shop.
 St. Anna of the Water-hog.
 St. Anthony of the Potter's Shop.
 St. Barbara of the Green Mountain.
 St. Francis of Assisi of the Water-hog.
 St. Sebastian of the Joyful Rapids.
 „ „ Bed-sheets.
 St. Francis of the Ulcers of the Happy Mountain.
 St. Gonçalves of the High Views of Norway.
 The Sandbank of the Holy Ghost.
 The Souls of the Sandbank of the River of Old Women.

ECCLESIASTICAL DIVISION.

In the earliest times, Minas Geraes belonged partly to the diocese of Rio de Janeiro and partly to the archbishopric of Bahia, or the bishopric of Pernambuco. In 1745, Benedict XIV., at the instance of João V., created the bishopric of Marianna. In 1853, the Government was authorized to petition the Holy See for a bull to create a new diocese, having Diamantina as its centre. In spite of these various decrees, Minas, with the two bishops it possesses, is subject to the diocese of Rio de Janeiro on the east, S. Paulo on the south, and Goyaz on the west.

I saw the bishops of Rio de Janeiro and Marianna when they were staying at Fazenda do Cortume; they were making a visitation especially for the purpose of holding confirmations, and triumphal arches covered with flowers were erected along the route they travelled.

POPULATION.

The lack of trustworthy and recent statistics prevents the exact number of inhabitants being given. The census of 1872, gave 1,669,276 free, 370,459 slaves; total, 2,039,735, or about six persons to the square mile. Of this number, 2,036,589 were Catholics, 3146 being described as non-Catholics. Of the men, 145,396, and 78,317 women, could read and write; while 901,630 of the men and 914,392 of the women were ignorant even of this elementary knowledge. There are some 1084 schools scattered among the various cities and villages; but I can give no information as to their efficiency, though there are some 34,000 scholars on the books. I was told of a complaint lodged against a recently appointed Government inspector, on the ground that he could neither read nor write.

RAILWAYS IN MINAS GERAES.

Speaking on this subject, at the opening of the Minas Provincial Assembly, August 1, 1882, Senhor Dr. Theophilo Ottoni said, "Buried amongst her mountains, separated from the ocean by the territories of some of the states bordering on her, Minas could not begin railways until the locomotive of the Dom Pedro II. line arrived at her frontiers. It was only in 1871 that the

provincial government authorized the construction of our first railroad."

In May, 1871, the General Assembly sanctioned the prolongation of the Government Trunk Line, Estrada de Ferro Dom Pedro II., and made a credit of 20,000 contos of reis (₤2,000,000 at 24*d.* to the milreis) for that purpose.

In 1883, there were 256½ miles of railway open for traffic in the province, 108 miles were in construction, 172 miles were surveyed, and 1506½ miles were authorized; making a total of 2043 miles. By the end of June, 1884, 715 kilometres, or 447 miles, were open for traffic.

The Estrada de Ferro Dom Pedro II.—Captain Burton, speaking of this railway in 1867,* says, that three valleys claimed the honour of being considered for the selection of a route: those of the Pará, Paraopéba, and Rio das Velhas. The last-named valley was chosen. This railway has a gauge of 1½ metres. It enters the province near the station of Parahybúna, at about 226 kilometres from Rio de Janeiro. When I arrived in June, 1883, the traffic extended as far as Carandahy (420 kilometres); but in January, 1884, after a long interruption of goods traffic, owing to the injury done to the banks and cuttings during the rainy season, the line was opened to Lafayette (Queluz), 468 kilometres from Rio. The works are now in progress for the prolongation through Sabará to Sancta Luzia, which is in the valley of the Rio das Velhas.† This railroad has an extensive system of lines and branches in the province of Rio de Janeiro, but as yet in Minas its only branch is the São João del Rey Line.

This Dom Pedro II. railway is a government line, and no one really knows what it has cost. One thing is certain, that everyone who has had to do with it has been enriched. All the work is done in the most costly manner, and a vast amount of expense has been incurred, such as retaining walls five feet thick where they are unnecessary. The platelaying, for instance, has been let at five times its cost. The contractors feed their workmen, de-

* "The Highlands of Brazil," vol. i. p. 153.

† It has lately been decided that the prolongation of the railway beyond Lafayette is to be on the metre gauge, and the portion already constructed is to be taken up and relaid (January, 1886).

ducting on this account certain amounts from their wages. But the wages are not paid; the men are told by the contractors that the Government has not paid them—the result is long arrears. And at length some of the men, weary of waiting, go away in disgust, and are compelled to sell the wages due to them, at an enormous discount, to the shopkeepers.

The published returns appear very satisfactory. For instance, in October, 1883, the receipts over the whole line are stated at 1,169,903 milreis, and the expenditure at 633,939 milreis; for November, 1883, receipts 1,054,307 milreis, expenditure 505,076 milreis; and for February, 1884, receipts 861,454, expenditure 478,053 milreis; but nothing is said as to the liquidation of, or interest on, the cost of construction. The dividends are, I believe, about five per cent. per annum.

The Estrada de Ferro Oeste de Minas.—This line was opened August 28, 1881. It extends from Sitio on the Estrada de Ferro Dom Pedro II. (364 kilometres from Rio) to the town of São João del Rey; and the majority of the imports and exports to and from the Pará valley and that neighbourhood are conveyed by this railway. The length of the line is 100 kilometres ($62\frac{1}{4}$ miles), and the gauge is only 0·76 metre, or 2 feet 6 inches. It is proposed to extend this road to the navigable waters of the Rio Grande, that flows into the Rio Paraná, which goes to Buenos Aires. During thirteen months the receipts on this railway were 160,585 milreis, and the expenditure 127,219 milreis. There were 10,454 passengers.

It is amusing—when the giant American locomotive which draws the cars from Rio de Janeiro steams into the station at Sitio—to see the microscopic engines of this railway, with its train of diminutive carriages waiting on the other side of the platform.

Estrada de Ferro Ouro Pretana.—This branch line from the Estrada de Ferro Dom Pedro II. near Sabará to Ouro Preto is in course of construction. It will be fifty kilometres (thirty-one miles) in length, with one metre gauge. The engineering difficulties to be overcome are enormous, and there will be many tunnels. Owing to the abundant presence of magnetic ore, the compass is rendered useless in the construction of the tunnels.

The *Leopoldina* line is of one metre gauge and 203 kilometres in length. It extends from Porto Novo (Estrada de Ferro Dom Pedro II.), on the Parahyba river, to Presidio. This railway was opened in July, 1877. In one half year its receipts were 430,077 milreis, and expenditure 287,055 milreis; in the next six months the receipts amounted to 836,047 milreis, and the expenditure 316,188 milreis.

The *Minas and Rio Railway* was constructed by Mr. James Brunlees (then President Inst. C. E.) as the engineer, Messrs. Waring Brothers being the contractors. The line was opened with a grand ceremony by the Emperor, who, with the Empress and the Conde d'Eu, went over the whole length on the 22nd and 23rd of June, 1884. A column and a half appeared in the *Journal de Commercio*, describing their triumphal progress and detailing all particulars of the line. The railway extends from Cruzeiro, on the São Paulo line, near Queluz, in the province of Rio, to Tres Corações, on the Rio Verde, an affluent of the Rio Grande. The total length to Tres Corações is 170 kilometres (132 miles). The gauge is one metre. The most important work is a tunnel through the Mantiqueira Mountains, 997 metres (1080 yards) long. There are also five small tunnels. This line has furnished the text for a lengthy and somewhat bitter correspondence, both at home and in Brazil, on the railways and finances of that country. But it is not my intention to add my quota here to the matter in dispute, as my statements concerning Brazilian finance will be found in a later note.

It is needless to say anything respecting other railways proposed, though not yet commenced; but I must refer for a moment to the line on the survey of which I was engaged. This railway, the Minas Central, is to extend from Christiano Ottoni (Estrada de Ferro Dom Pedro II., 438 kilometres from Rio de Janeiro) to Pitangui, with a length of some 250 kilometres and a gauge of one metre. It has an authorized extension to São Antonio dos Patos, whence it is to proceed into the province of Goyaz, which province is at present far removed from all such means of civilization and communication. Starting on the Rio Paraopéba, which is there a mere stream, it will pass across the head waters of that river to the important town of Entre Rios,

where I passed five months, and thence, gaining the valley of the Pará (one of those originally proposed for the Government Trunk Line), it will proceed along this valley to the town of Pitanguy. A glance at the map will show the importance of this railway, especially when one bears in mind the gold deposits at Pitanguy. Pitanguy is at least twenty leagues (eighty miles) from Sabará and the Rio das Velhas, besides which there are two ranges of mountains to be crossed; the first dividing the Pará from the Paraopéba, and the second separating the Paraopéba from the Rio das Velhas. The valley of the Para is wide, beautiful, and very fertile, well-populated for those regions, and capable of untold development. Our line of railway will be of the utmost service, as at present merchandise to and from Pitanguy has, at least, some thirty-six leagues of transit to the Estrada de Ferro Dom Pedro II.; and, since the opening of the line to Queluz, it is nearer than the São João del Rey Railway. The Minas Central was strongly opposed by this last-named branch, which is easily understood, as it will tap the districts whence they derive much of their traffic; and the shares of that line fell heavily when the news was published of the arrival of our staff at Rio de Janeiro. The authorities of the São João Railroad presented a petition to the provincial government at the close of 1883, objecting to the Minas Central as infringing on their privileges; but the Government, having considered their request, refused to listen to it. All the landowners to whom I spoke on the subject invariably said that the São João line *acabou* (was done for) now our railway was in hand. Certainly the line to Pitanguy is a necessity—certainly it would vastly increase the cultivation and population, as has been the case in the last year along the newly opened Trunk Line; and the line should be made, if Brazil continues to retain the favourable opinions of English investors that it has to-day. It has a guaranteed Government interest, and must be at least as profitable as many of the others, while it may in time far surpass them. *Che sardá, sardá*; the future of this scheme, of the province, of the empire, is fortunately in abler hands than mine, and I presume that no statements that I may have occasion to make in my notes on the finances of Brazil can do anything to retard the construction of the Pitanguy

railroad. Personally, and in the interest of many excellent residents in those parts who have proved true friends to me, and who wish for the line, I hope it may ere long be opened for traffic.*

In concluding these notes on the railways of Minas Geraes, I may remark that it appears a pity that such varied gauges should have been used. Brazil is as yet far from a "battle of the gauges," which created so much trouble in England; but some time in the future it may be found out that a mistake has been made.

NOTE ON FERNANDO DE NERONHA.

To-day, as I have stated, but little is known of this place, and ships generally give it a wide berth. It belongs to the province of Pernambuco, and lies in lat. $3^{\circ} 50'$ south, long. $32^{\circ} 25'$ west of Greenwich. It is distant from the coast about two hundred miles, and consists of one large island and several smaller ones,† the whole being, according to Darwin,‡ nine miles long by three broad. Darwin considers it all to be of volcanic origin; "the most remarkable feature is a conical hill, about one thousand feet high."

It may be of interest to describe an abridged account from the translation of "A Voyage to South America, . . . undertaken by command of His Majesty the King of Spain, by Don George Juan and Don Antonio de Ulloa, both captains of the Spanish Navy, members of the Royal Societies of London and Berlin," etc.§ It is a most interesting work. These explorers landed on the islands May 21, 1745. They say, "On our arrival we were informed that the French East India Company had made a settlement on it as a convenient place for their ships to put in at for refreshments; but the Court of Portugal, being unwilling that either the French or any other nation should have a settlement so near the coast of Brazil, obliged them to evacuate it. This resolution was taken about seven years ago, since when . . . forts have been erected, and a colony settled on the island. . . . This island has two harbours capable of receiving ships of the greatest burthen: one

* Construction began January 6, 1885.

† Hart's "Geology and Physical Geography of Brazil," p. 478.

‡ "Narrative of the Surveying Voyages of H.M.'s ships *Adventure* and *Beagle*," vol. iii. p. 10.

§ Published in London, 1758.

is on the north side, and the other on the north-west. . . . The barrenness of the island does not proceed from any defect in its soil, which produces every species of grain and fruits common in hot climates, as experience has sufficiently demonstrated, but from the want of moisture ; for, besides two or three years often pass without any rain, there is not the least drop of water to be found throughout the island, except in some brooks. . . . On the 19th of May came on violent showers, which continued the whole time we remained near the island. The inhabitants use the water which they save in pits resembling cisterns ; but this, as well as the waters of the brooks, on its beginning to rain, grow thick and brackish. The Portuguese, indeed, say that in the inward parts of the island, where these brooks have their origin, water is never wanting, and that it is clear and wholesome.

“In the inward part of the island is a Portuguese town, in which reside the parish priest and a governor, who, on advice of any ships being in sight, repair to the forts, which are all well garrisoned, there being only in fort Remedios, while we were there, near one thousand men—partly regulars sent from Fernambuco, which are relieved every six months ; and partly transports, from all the coast of Brazil ; and some, though few, which are settled here with their families—all being poor people and Mestizos (descendants of Spaniards and Indians). There are also some Indians who are sent to work on the fortifications, and likewise to serve the governor and other officers in the island. . . .

“The common food of the inhabitants of all ranks, both here and throughout Brazil, is the *fariña de Pau* or wood-meal, which is universally eaten instead of bread. . . . They are so habituated to it that, even at a table where they have wheat-bread at command, with every mouthful of it they take a little of this meal. Besides this flour, which is, in fact, nothing more than wood-meal or sawdust, both with regard to taste and smell, they eat a great deal of rice and sugar-cane, brought from Fernambuco. . . .

“After the second settlement of the Portuguese here, besides the little plantations, which was one of their first cares, they also brought over cows, hogs, and sheep, in order to breed those useful creatures. And, as a small quantity of flesh serves the

ance to those who differ from them, the object of these lines will have been gained.

For those who have been educated from childhood in the Roman Faith, who have known no other, and who regard with warped intellects the other branches of the Church, it is conceivable that for them it is sufficient. But I cannot comprehend any who have been brought up in the freedom and superior light of the English Church giving their allegiance to Rome. Her errors in theory as well as practice appear so very evident.

As regards the one service, the only one commanded by the Divine Founder of our holy religion, and therefore binding on all Christians, called Holy Communion, the Eucharist (sacrifice of thanksgiving), the Mass, the Lord's Supper, or Breaking of Bread, I weekly saw hundreds attending this service. It was, of course, in Latin. The priest's voice alone was heard; the congregation did not utter a word. They crossed themselves at the Gospel, beat their breasts at the *non sum dignus*, and their demeanour was generally reverent; but they hardly ever communicated, even at Easter. What communion is there? The idea, noble in itself perhaps, of one universal language for the celebration of the Holy Mysteries is a mistake. Though, of course, the first object of the Eucharist is the worship of God and the representation of the One Sacrifice on behalf of mankind, yet the edification of the worshippers who assist should be also considered; but with the service in an unknown tongue the greatest good to the greatest number is not and cannot be attained. The people attend as a duty, but few derive much benefit; and I found that attendance is considered as a kind of fetish or charm!

The celibacy of the clergy is enforced. How few keep the vows! The number of children that many of the priests have is well known, and many others are notorious evil-livers! How can it be otherwise? The number of men to whom the virginal life is possible is proportionately very small. Preternatural grace of the very highest degree is necessary to resist the natural inclination and the influence of the habits and customs of those with whom the priest must continually associate, especially in warmer or tropical climates; and this lofty standard cannot be expected of many thousands of men who have not, in all cases, entered the priest-

would on no account take on himself the responsibility of permitting collections to be made on shore, or soundings to be taken adjacent to the coast, although at first he appeared willing to allow this. . . . On it were about 1400 prisoners, 160 soldiers, and four officers, besides the commandant or governor. . . . 'The prisoners are not confined in large buildings, but each man erects a hut for himself with laths and mud, so that the settlement occupies a considerable area. . . . All the prisoners muster at morning and evening parade, and are 'told off' in the morning for their allotted work during the day—some to attend the sheep or goats, others to labour in the fields, and others, again, to fish." The fishermen use a catamaran. "There are plantations of sugarcane, maize, cassava, sweet potatoes, bananas, pumpkins, and melons on the island. The latter, both water and marsh, are remarkably fine, both in size and flavour; they cost about three-pence each, and a large store was purchased." * The Report contains an imposing view of the Peak.

RELIGION.

Having lived for some months far inland, and having had many opportunities of seeing the religious life of the people removed from the outward influences which obtain in seaport towns, such as Rio de Janeiro—a people only partly civilized, no doubt, but still superior to many other South American Roman Catholics; admiring their deep religious feeling and careful observance of outward ceremonial; and having also for some years devoted considerable study to theological matters;—I feel constrained to give expression to a few thoughts on the subject of religion. While not expressing my own individual views, I make no apology for the sentiments I express, though I fear that fifty out of every hundred readers will each cross out some sentences, till there will be but a skeleton remaining of these paragraphs. I write as a member of the Church of England who yearns for the attainment—which I fear is almost impossible, as what is deemed vital truth by one is termed heresy and error by another—of a *modus vivendi* between the various branches of the Christian Church. If, however, any one be induced to make more allow-

* "Narrative," vol. i. pt. 1, pp. 210, 211. London, 1885.

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hood from the highest motives. St. Paul, a celibate, while emphatically proclaiming the virgin state as the highest possible to mankind when undertaken from the true standpoint, said, "Marriage is honourable in all,"* and "it is better to marry than to burn."† Our Blessed Lord also, when His disciples said "It is not good to marry," answered them thus, "All men cannot receive this saying, save they to whom it is given."‡

The invocation of saints has degenerated into their usurping the position of the One Mediator, and the natives also invoke localized names of Our Lord, the Blessed Virgin Mary, and the saints, appearing to consider, *e.g.*, that the Good Lord Jesus of the Good Garden, and Our Lady of the Junction of the Rivers, are more immediately their helpers.

This cult of the saints is exercised in a practical way, which appears worthy of notice. The instances I detail below may have their counterpart in other Roman Catholic countries, but I, at least, am not cognizant of it.

"The military standing of Sancto Antonio in the Brazilian army is one of considerable importance and diversified service. According to a statement of Deputy Aristides Spinola, on the 13th of June, 1884, the eminent saint's own feast-day, his career in the military service of Brazil has been the following:—By a royal letter of the 7th of April, 1707, the commission of captain was conferred upon the image of São Antonio da Barra, of Bahia. This image was promoted to be a major of infantry by a decree of September 13, 1810, and by an *aviso* of July 29, 1859. His pay was placed upon the regular pay-roll of the department of war. The image of São Antonio in Rio de Janeiro, however, outranks his counterpart of Bahia, and seems to have had a more brilliant military record. His commission as captain dates from a royal letter of March 21, 1711, and was conferred on him by Governor Antonio de Albuquerque Coelho e Carvalho, in recognition of his valorous exploits in resisting the French invasion under Duclerc. He was promoted to a major of infantry by a decree of July 14, 1810, and to a lieutenant-colonel July 26, 1814. . . . He was decorated with the Grand Cross in the Order of Christ by a decree of August 13, 1814, and his pay as lieutenant-colonel was made a

* Heb. xiii. 4. † 1 Cor. vii. 9. ‡ St. Matt. xix. 10, 11.

permanent charge on the military list by an *aviso* of August 13, 1833. . . . The image of São Antonio of Ouro Preto, Minas Geraes, attained the rank and pay of captain by an *aviso* of February 26, 1799. His career has been an uneventful one, and has been confined principally to the not-unpleasant task of drawing \$480 a month from the public treasury. The salaries of all these soldierly images are drawn by duly constituted attorneys, and are devoted to such repairs and furbishing as the wear and tear of their annual campaigns may render necessary. The balance left over is devoted to the private expenses of their households." *

The iniquity of indulgences still obtains. I have elsewhere referred to the most flagrant sin of authorizing marriages within the prohibited degrees. Other indulgences, such as permission to eat meat more than once a day in Lent, are comparatively trivial, as thereby sin is not licensed; but, as I said to some Brazilians, if a thing be wrong, paying money will not make it right. If it be a matter of conscience, and ill-health or weakness compel any one to set aside the rules of the Church, surely the priest should give such permission, without payment being exacted.

The prohibition of reading the Bible, originally instituted owing to the tendency of sects and individuals to distort the Scriptures to suit their own ideas, has proved to be evil in its consequences, and to-day the Roman Church chiefly fears the laity getting hold of the Bible, because they would then find out how much they have been taught which has no foundation in the Scriptures. I spoke to many intelligent men in Brazil who, having read the Bible, have discovered this, and cannot understand the continual promulgation of new doctrines as articles of faith; but they said, "All human systems have more or less error, and we know of no better."

I also met with many who longed to read the Bible, thankfully receiving and carefully reading the Gospels or New Testaments that I gave them. Though there is so much that needs reforming, I never tried to unsettle their minds or make them dissatisfied with their faith, but merely to give them a fuller knowledge and clearer appreciation of the history of the life, death, and resur-

* *Rio News*, July 5, 1884.

rection of Our Divine Redeemer, while explaining personal religion.

Unfortunately, many of our own Church and Protestants who labour among Roman Catholics are often too eager to instruct, beginning with violent abuse of the Roman Church rather than educating their hearers by enlarging on the truths they have been taught and instilling the doctrines of the Gospel, leaving the truth to work, as Elisha did with Naaman. Therefore, such teachers are spoken against by the ecclesiastical authorities, and the people refuse to listen. I could not have distributed a single Gospel with advantage without feeling my way most carefully.

One point is very praiseworthy in all the sermons I heard—the priests never weary of dilating on the atonement of Our Divine Redeemer as the one ineffable sacrifice necessary for the satisfaction of divine justice and substitutionary for each individual soul, through which alone the sinner can find acceptance with God; though they do teach that the prayers of departed saints—who should be invoked, as well as those of one's relations and friends who are alive, are of use in obtaining blessings from God.

The doctrine of the atonement is, however, one which is often lost sight of in our pulpits; men refuse to believe in the heinousness of sin, refuse to believe that the justice of a perfectly holy God requires full satisfaction for sin, and, by rationalistic arguments derived from degraded human reason, dwell only on the fatherhood and love of God to mankind. There are two rocks, Scylla and Charybdis, against either of which all Christian people may make shipwreck of their faith; they stand one at each end of the line of intellectual thought. The first is Formalism, the second Rationalism. The former is the outcome of a kind of parasitic religion, handing over the conscience to the direction of another, and considering that the individual has no right to think for himself and examine the doctrines whether they be of God, or else thinking that a feeble acquiescence in certain dogmas and the performance of certain forms and ceremonies is all that is necessary. The second phase is the result of revulsion of feeling from the other extreme, not only refusing to listen to the voice of the Church, the directions of the Bible, and the dictates of conscience, but setting up their personal puny and corrupt intellect as the

supreme appeal—refusing to believe all that seems contrary to their individual ideas of justice or expediency. This latter is perhaps the more fearful error, as by it the finite utters the awful blasphemy of daring to dictate to the Infinite.

It is a thought which should be much considered, that Our Lord's last prayer for unity is too often lost sight of. Unity in design, variety in carrying out that design, is the universal law in the natural world; would that it were more fully recognized in the Christian Church. There are hardly two leaves on any tree exactly similar; so there are few men of the same mind and temperament. All branches of the Church may be described as ranged in a circle, with Christ as their centre; the nearer they approach Him, the closer they are drawn to one another.

Certain doctrines, of course, must be insisted on, such as the Trinity, the divinity of the Son of Man and His atonement, salvation in and through Him alone. We must likewise remember the inability of man to make himself acceptable to God, that prayer is the life of the soul, that the Christian life is a conflict, that we are alone able to fight by supernatural aid through the indwelling of the Holy Spirit, and that the sacraments are also divinely appointed means to that end.

Surely, this is a basis on which all Christians should meet, and the details, though in themselves important, should hold a second place. One man may consider that a service bare of ritual, but from the heart, is more acceptable to God; another, that ornate ritual, with vestments and incense, is a closer resemblance to the unending worship in heaven, as revealed in the Apocalypse. "Who art thou that judgest another man's servant? To his own master he standeth or falleth." "Let every man be fully persuaded in his own mind."* If every one would exercise more of the divine gift of charity, and were more inclined to acknowledge and appre-

* Is it not virtually to deny that charity is the greatest of the three theological virtues (1 Cor. xiii. 13), when a Church, *e.g.* the Roman Communion, excommunicates all other branches, calling them heretics, or when Protestants look upon the various Christian Churches as idolatrous and ripening up for fierce judgment, and therefore, while refusing to extend to them the right hand of fellowship, will even prefer anti-Christian religions or sects, such as the Jews or Unitarians? I refer only to the *odium theologicum* between Churches or sects *per se*, and not to individuals of any denomination.

ciate the good in others, instead of dwelling on what each considers their faults or errors, one great step towards unity would be attained. The bigotry and lack of charity amongst Christians is the fact which affords—perhaps more than any other—the ground for the arguments of Atheism against the Church of our divine and blessed Redeemer.

SLAVERY.

It may be confidently asserted, owing to the very great movement which has been daily increasing in earnestness, and which engrosses the mind of every one throughout the length and breadth of the empire, that before long slavery will have ceased to exist in Brazil.

The law of Rio Branco, or *Lei do ventre livre*, was passed September 28, 1871. It provides that the children of all slaves born after that date shall be free; and it also founded the Emancipation Fund. The Bill was brought in by the Visconde do Rio Branco, then President of the Council, and Director of the Polytechnic School at Rio de Janeiro. He is a staunch Conservative. The Bill passed through the two Chambers during one of the visits of the Emperor to Europe, when the Princess Isabel was Regent. She is the wife of Count Louis Philippe Gaston d'Orleans and Conde d'Eu.

Since that date the abolition of slavery has been steadily progressing, through the Emancipation Fund, and by private acts of freeing slaves during their life, or after the death of the owners, as I shall describe in due course.

Slaves can still be bought, but there is a tax of a conto of reis* on importing them from other provinces. The cost of slaves from fifteen to twenty-five years of age is from four hundred or five hundred milreis to one or two contos. Since 1831 no slaves can be brought into the country; but this law has been evaded, as many have been imported from Africa from time to time. In Gardner's Travels,† he mentions that in 1841 he saw, near Petropolis, twenty young negro boys recently imported, of from ten to fifteen years of age, none of whom could yet speak Portuguese.

* A conto is a million reis = roughly £80 to £100.

† Gardner's "Travels in the Interior of Brazil," p. 536.

Dr. Pedro Ferreira Vianna, in an article * on emancipation, advises the employment of prudence and law. He says—

“Slavery is an institution of our civil law. But there is also in our civil code the law of November 7, 1831, which says, Article 1, ‘All slaves which shall enter the territory or ports of Brazil, coming from abroad are free;’ and in Article 2, ‘Persons who knowingly buy as slaves those who are declared free in Article 1, are included under the term importers; these importers, however, are only compromised subsidiarily to the expenses of re-exportation, subject withal to the other penalties.’ One of these penalties is that of Article 179 of the criminal code, for those who reduce free persons to slavery. . . . The nation is therefore compelled to indemnify for those slaves who are liberated if they came before that law, and to restore liberty to those who came after it. The judges cannot, without injustice, fail to indemnify the masters. Abraham Lincoln and the Americans had no such law as that of 1831, and thus spoke in the name of God and of humanity. . . . *Fiat justitia pereat nec pereat mundus.* I trust that in loyalty none will say the law has fallen into disuse. . . . The law being known, nothing is easier than to put it into execution. The Imperial Government cannot and should not liberate by the Fund of Emancipation the slaves who are free in virtue of the law of 1831. They know by the books, the invoices of sales, the baptismal registers of the descendants of these Africans, and by other documents, who are those comprised under this head. . . . The civil law states that there are hundreds of thousands of free men reduced to slavery (about one-half of the population). . . . For these men no indemnification can be allowed. The voice of the civil law will not be smothered, because it will be heard in the recesses of every conscience. . . . In my words there is not only charity, but the desire that you should reconcile yourselves with God, with humanity, with natural instinct, with civil law, with the slave; and this reconciliation means liberty.” He then says that everywhere there should be organizations to prevent freed slaves being continually threatened, prisons being invaded and captured slaves assassinated, and finally to guarantee justice. He concludes by extending the hand of friendship to all emancipators, and offers

* *Gazeta da Tarde*, June 30, 1884.

"a prayer that the dead may not forget us in their prayers for these unhappy ones."

The *Rio News*,* commenting on this letter, says, "The Brazilian slave-owner never obeyed the law of 1831, because it was antagonistic to what he considered his own private interest—an uninterrupted supply of cheap slave-labour. . . . For some twenty-five years he brought in over half a million of Africans after 1831, and it was only after further legislation and the forcible intervention of foreign powers that he finally gave up the traffic. Since the passage of the law of 1871 he has pursued a similar policy with relation to the avoidance of its requirements. There has never been an honest registration of slaves, nor a strict observance of the provision guaranteeing liberty to the children of slave mothers. . . . No man can justly claim the protection of laws which he habitually and openly violates. If a law is worth enforcing, it is worth obeying."

The "Funda de Emancipação," or Emancipation Fund, is divided at certain intervals by the Government of each province between the different municipalities. Every day one reads in the papers of some slaves liberated by this fund. The administrators select their candidates carefully. For instance, they prefer to free a slave whose husband or wife is already free. Again, the fazendeiros (landed gentry) give some of their slaves land, and allow them Sundays and saints' days to cultivate it; or if the slaves are hired out, their wages on those days belong to them. Slaves can thus earn money to assist in buying their freedom; and such are also preferred as recipients from the Emancipation Fund. When the time for liberation arrives, the master and slaves appear before the municipal judge, and their value is handed over to the owner.

I may quote, among many instances that I heard of, a gentleman at Pitanguy, who possesses a slave who is a "pedreiro" (stonemason). Out of every \$2 500 reis that he receives as wages, the master takes \$1 300 reis, and gives the slave \$1 200 reis. Another man has a black cook who lived five years in Rio, being three years in a French house; he obtained his freedom in 1870. He speaks a little French, and, though he cannot read, he knows

* July 5, 1884.

something of geography, and can tell on a map the names of countries, their chief towns, rivers, etc.

I will now give a few examples of the daily-occurring liberation of slaves.* "The President (of the province) of Rio de Janeiro has assigned the quotas of the Emancipation Fund under the last distribution to the various municipalities of the province. The total amount assigned is 370,000 milreis, and the total slave population is stated to be 263,339. The municipality credited with the smallest number of slaves (584) is that of Petropolis." "Three slaves were recently liberated at Monte Verde; Goyaz, through the Emancipation Fund, at a total cost of \$2970, towards which the slaves contributed a total of \$1052 from their private savings. Entre Rios freed one slave for \$1000, the slave contributing \$350. Of the hundred odd slaves who assisted in repressing a revolt in the House of Detention on December 14, the Government has secured the liberation of about eighty, partly by purchase and partly by private gift."† The *Provinciano*, newspaper of Parahyba do Sul, gives the following list of those who have emancipated all their slaves:—

"Dona Anna S. José, 16 slaves liberated, and a farm given to them for their own use.

Dona Maria de Caula, 16 slaves liberated, with the condition of serving five years on the works of the Casa de Caridade.

Condessa do Rio Novo, 200 slaves liberated by will, and the Cantagallo Plantation given them for a home.

José Eynes Baganha, Portuguese, died in Lisbon, left \$100,000 for the liberation of his old slaves.

Barão de Simão Dias, 163 slaves liberated, who remain established on his plantation as labourers.

Barão de Santo Antonio, 168 slaves liberated by will, and two plantations given them for their own use."

In Dr. Vianna's letter, from which I have quoted, he denies the right of applying the Emancipation Fund to the slaves who should be free; the theory is without a flaw, but it would probably prove impossible to be carried out. The advocates of immediate abolition should consider that (1) as it would be impossible to ascertain who should be free and who is legally still a slave, (2) as the question of the compulsory labour of freed blacks is very

* *Rio News*, January 15, 1884.

† *Ibid*, January 24, 1884.

difficult, (3) as the effect of the liberation of 1834 in the West Indies has done incalculable harm to the prosperity of those islands;—perhaps the most expedient way of annihilating slavery may, after all, be to allow the present very energetic movements for the redemption of slaves to continue, and not to force compulsory abolition. The interests of the slaves themselves, as also of the masters, will thus be more surely advanced. The difficulty of administering the law of 1831 would be very great, as the slaves, or their descendants, who should be free men, according to that law, have been so often sold, or otherwise changed hands, no record of age being kept, and the registers having been otherwise falsely made up, so that the loss entailed on the present owners by compulsorily freeing them would be very great.

I have seen several letters in the *Times*—one about the end of December, 1884—detailing fearful horrors practised on slaves, but not a word of the awful outrages committed by the Socialistic members of the Abolitionist movement. I may mention, *en parenthèse*, that I had certainly opportunity of seeing something of the treatment of slaves, being thirteen months in the country; but I never came across any other than considerate kindness from master to slave, sometimes even far greater benevolence and consideration than is exercised towards servants in our own country which boasts of its freedom. I only heard of one case, but had no opportunity of further inquiry, in which shrieks were heard coming in from a neighbouring fazenda, one Sunday morning, when the master was apparently castigating some unfortunate, whether deservedly or not I cannot say.

I must give two examples of the effect of Socialist teaching, instances which, I know, are, alas! not uncommon.

A young man with some £50,000, bought a fazenda, as a country residence, and with it the slaves on the estate. He treated his slaves with great kindness, and improved their dwellings. On one occasion he saw, at a neighbour's, a slave in the stocks for some misdemeanour, who entreated this gentleman to buy him. He did so, and the slave became his body-servant. Some time after, he accompanied his master to Rio, where he was allowed to go about freely. He attended some of the Socialistic meetings of the lower class of Abolitionists, who

proclaim war against all masters, and counsel their murder and the dishonouring of their wives and daughters. The lessons he received took effect. The master, in due course, returned with his valet to his estate. One morning, at six o'clock, when he was watching from the door his slaves going to work, inquiring after their welfare, and attending to those who were sick or unable to work, this ungrateful youngster admitted two hired assassins by a back door, who set upon the master and clave his head open with a hatchet, subsequently pounding his body to a jelly with a huge coffee pestle (a block of hard wood, some six feet long). The three men were seized by those of the surrounding slaves who realized how good a master they possessed, and were lodged in gaol. There was a great commotion among the neighbouring fazendeiros. They knew that the penalty of the law would never be inflicted, and, gathering five hundred followers, the leaders being masked, rode up to the prison early one morning, shot down the guards, demanded the keys, dragged out the three murderers, and lynched them.

This excellent young man, who was a martyr to the cause of leniency, only a few days before his death (April, 1884) was relating in Rio how a relation of his had been saved from the shots of assassins. This man was also a kind master. One evening, a small negro boy told him that his death was decided on. He was in the habit of riding every night into a town to pay visits; the assassins were to wait for him at a certain point on the road, concealed in the forest. He locked up the boy, and ordered a slave, one of those implicated, to attend him on his ride. On the road, he said he felt cold, and, taking off his white cotton dust-coat, ordered the slave to give him the thick blue poncho that the latter wore, and to put on the white coat. The slave refused. The master then drew a revolver, and under compulsion effected the change. He then ordered the slave to ride ahead, which, the revolver being presented at his head, he most reluctantly did. On nearing the ambush, the fazendeiro said, "Gallop ahead, I will follow." On passing the spot where the assassins lay concealed, a volley was fired at the man in the white coat, who fell dead; the master drew his horse up on his haunches, and galloped off by another road.

These Abolitionists, according to all I hear, are the Socialists and Nihilists of Brazil, and their influence among the slave population is very great. Should a general rising of slaves occur, the result might prove most disastrous, as the greater part of the privates in the army are negroes or mulattoes, and the majority of the freed blacks, at least in Rio, notoriously form the dregs and scum of the population ; and, as probably they would all join, no house or property would be safe. A man of the English-speaking race, named Clapp, is one of the chief leaders of the Abolitionist party in Rio ; he abuses the law of 1831. Some time since, for instance, he carried off consecutively two slaves, who were sent into Rio every day by their master to sell fruit. On the first occasion, he sent a note to the owner, stating that the slave wished to be free, that he was valued at two hundred milreis, and that that sum was paid into the Treasury. Many difficulties were raised, there was great delay, and finally the master was obliged to give way without receiving the money, while the slave was retained. A short time afterwards, the second slave was kidnapped under similar circumstances, and a criminal process was begun against the owner for keeping a free man in slavery. The owner was imprisoned, and appealed, stating that the slave had been left to him by will, and proved his assertion. The judgment was reversed by the courts, but the slave was liberated, and the two hundred milreis redemption money was never paid in either instance.

On the 25th of March, 1884, slavery was abolished in the province of Ceará. The *Rio News* * says, "The movement began only fifteen months ago, the first municipality liberating its slaves on the 1st of January, 1883. The new tax law of last November greatly accelerated this progress, because it made slave-holding impossible, the value of the slave being less than the tax." A week's festival was held in Rio de Janeiro in honour of the emancipation of Ceará. "Large sums of money were realized from donations and the proceeds of bazaars, several slaves were liberated, and a movement set on foot to secure total emancipation in the municipality of the imperial capital."

I was informed in September, 1883, that there were then eight or ten municipalities in Ceará without any slaves ; Fortaleza, the

* April 5, 1884.

capital town, having been freed on May 24, 1883. The Sociedade Libertadora freed 122 slaves in one day in the towns of Baturité, Acarapi, and São Francisco. There are some two hundred or three hundred such societies in Brazil.

The gradual emancipation of Ceará had been carried on, as elsewhere, before the total abolition was agreed to; and I heard of one slave-owner who died four years ago, and directed his heir-at-law to free four hundred of his slaves in four years, which was carried out in 1883.

On July 10, 1884, the vast province of Amazonas declared that all their slaves were free; and on the 24th, in the first page of the *Gazeta da Tarde* appeared, in letters more than an inch long, the words AMAZONAS LIVRE—Amazons free. In a leading article that paper said, "Abolition, considered from the highest moral point of view, is the expiation of slavery; it is the restoration of national dignity, the completion of the independence of the Brazilian people." The *Gazeta de Notícias* of July 22nd said—

"Without violence, without disturbance of economic or social order, the province of Amazonas has paid its tribute nobly and gallantly to liberty and civilization, which shortly will restore, by prosperity and riches, the small sacrifice she has made them. . . . It is to Dr. Theodureto Souto that this province owes, in a great measure, the advantage it has secured. . . . The liberation of Amazonas, which by itself would be one of the most important facts of our contemporary history, has to-day a significance of far greater importance; it is one more irrefutable testimony that in regard to the servile element it is not now possible to delay or to recede."

It must, however, be remembered, when the northern provinces boast of being in advance of the southern as to abolition, that a few years since some hundred thousand slaves were exported from the north and sold in the south.

The great difficulty in total abolition, where many slaves are in question, is as to obtaining the necessary continuous labour in the plantations. When the slaves are selected and freed gradually, or educated up to freedom, they remain afterwards as labourers on the old estates, and the work is not hindered. But when compulsory labour is suddenly removed, the natural indolence of the native asserts itself; and, finding that one or two days' work in the week supplies enough money for him to keep

soul and body together, the free black becomes independent, and prefers to sit on his heels, and smoke, and talk, or sleep. There is a vast difference between the pure negro and those of mixed blood. From what I have seen I should consider it almost a miracle, under existing circumstances and surroundings, for the negro to have any proper spirit in him ; but with those who have an infusion of white blood it is otherwise, their intellectual powers appear much greater, and they have some ambition to get on in the world.

The new Cabinet, who accepted the portfolios on June 6, 1884, lost no time in dealing with the slavery question. On June 25, a Cabinet Council was held, the Premier, Senhor Souza Dantas, presiding. The points under consideration may be summed up under five heads :—1. The localization of slave trading. 2. The increase of the Emancipation Fund. 3. Classification and arbitration of value. 4. Liberation of old slaves. 5. The work of freed slaves.

On the 15th of July, Senhor Souza Dantas presented his bill to the Chambers. The bill was divided under five heads. The first item dealt with old slaves, proposing that "the slave of sixty years of age, attained before or after this law, should acquire *ipso facto* his liberty." The second item dealt with registration, requiring "declaration of name, colour, age, condition, nature, filiation, capability of work, profession, and value," allowing a year for such registration, "such slaves as are not registered in that term being considered free." The third item dealt with the Fund of Emancipation, a value of eight hundred milreis being allowed for slaves of less than thirty years of age, seven hundred milreis from thirty to thirty-nine, six hundred milreis from forty to forty-nine, and four hundred milreis for quinquagenarians. This item provided also for the tax to be paid by legatees who obtained slaves, ranging from ten per cent. to direct heirs, and twenty per cent. to brothers, up to fifty per cent. to strangers, half these taxes being charged on transactions effected while the owners were alive. The fourth item dealt with the localization of slaves, declaring that the slave should not be removed from the province where he resides, or he would gain liberty. The fifth item dealt with terms of contract for the labour of free blacks.

That day's session was, as might be expected, a very stormy one, and, in the course of the debate, His Excellency the Premier stated that he would vote for a project of immediate total abolition, should such an idea be started.

The next morning there appeared an article in the *Journal de Commercio*, from which I make the following extracts :—

"One more grand step on the path of progress and civilization. One more great man for the national pantheon. The 15th of July, 1884, will be inscribed among the most glorious days of Brazilian history : for Senhor Dantas, it is the date of his obtaining immortality. To two eminent Bahian statesmen the history of the country will assign one antithesis : the Visconde do Rio Branco obtained that none should be *born* a slave in Brazil ; to Dantas is the glory that none should *die* a slave after half a century of work. It only remains, to complete the evolution of abolitionism, that none should *live* a slave. To those who consider Brazil as a great coffee plantation, who see in the slave only an instrument for producing coffee ; to those who have no tears for the sufferings of their fellow-creatures ;—to all these it will appear a slight thing, the hope of not dying in slavery, of not relieving till death the chains of the captive. . . . But to those who aspire to see their country regenerated, noble, and grand, placed among the first nations of the world ; to those who are convinced of the injustice of slavery—for, in spite of all, one cannot take away from the slave the quality of being man ; to those who have compassion and charity ;—to all these there is a great compensation in the certainty of not dying aged and yet still in slavery. . . . In good time the Senator Dantas came into power, and he soon had courage to undertake his glorious mission. Yesterday he redeemed well the engagements he made in the sight of his country and of humanity. Thus the evolution of abolition proceeds majestically on its way—*Rursus et ultra* (each time more and better)."

The *Gazeta de Noticias* of July 20, said—

"As to our friends in the Government, it is needless to say that it is to their interest that the question of confidence should rest on this one point in the ministerial programme, which constitutes the *raison d'être* of the Cabinet, and which was the reason of the accession to power of Senhor Dantas. This is, in fact, the idea with which the Liberal party intends to plead in the future election, to stand or fall ; and it has become the centre of national agitation in Parliament to stand by it, and to press on by all means to its accomplishment the imminent reorganization of the country, or to be beaten."

Dr. J. Nabuco, an ardent Abolitionist, writing to *Le Brésil*, of Paris, July 22, says—

"The conduct of Senhor Dantas has been dignified and loyal. The project of the law for the emancipation of slaves over sixty years of age is a very small concession, but we are bound to accept it, because it signifies the emancipation of Africans imported after 1831, who have been fraudulently registered as of greater age than was really the fact."

While this interesting matter was being debated, I left Brazil (July 28); but I find, from the *Anglo-Brazilian Times* of August the 1st, that—

"A ministerial crisis occurred on the 28th of July. After the introduction of the Government bill on Slavery, the forty-six Conservative deputies and the Liberal minority that seceded because of that bill, finding that they had a majority, . . . had been from time to time defeating the Government on matters of little importance, which the ministers and their supporters declined to consider Cabinet questions, declaring that they would accept the challenge only on the Government measure upon slavery. On the 28th, however, the Liberal opposition undertook a direct motion of want of confidence, before the bill on Slavery could be brought up for discussion upon the 1st of August, the object in thus anticipating that debate being apparently to evade direct reference to the real issue, the slave question."

After beating about the bush—

"Senhor Lourenço de Albuquerque, while frankly acknowledging that the Government measure on slavery was the sole reason for the secession of the Liberals, made a direct motion of general want of confidence, not mentioning slavery; but Senhor Penido, another member of the Liberal opposition, at once capped the motion with one declaring that the Chamber disapproved of the bill, and therefore denied its confidence to the Government, which last motion was adopted by fifty-nine to fifty-two. In consequence of this vote, the President of the Council obtained an audience of his Majesty the Emperor the same afternoon, and received orders to convoke the Council of State to meet at the palace at 8 p.m. for consultation on the advisability of a dissolution. Of the eleven councillors present only three were for dissolution; but, as was expected, his Majesty decided on not permitting the Ministry to retire, and on conceding to it a decree of dissolution of the Chamber of Deputies. On the 30th, the President of the Council informed the Chamber of Deputies that as his Majesty had consented to the Ministry's request for dissolution of the Chamber, after passing the budget for the current year, he hoped that the means of administration would be voted with the least possible delay. The Conservative leader did not refuse, and the leaders of the Liberal opposition declared that the Government could count upon their votes."

The dissolution took place on September 3, and the election was to be fought on the lines of the great issue now before the

country, viz. "Whether the emancipation policy of the Dantas ministry, as set forth in the Government Slave Enfranchisement Bill, shall receive the proper endorsement." * The *Anglo-Brazilian Times*, a little later, says—

"What the result of this appeal to the electorate will prove it is as yet too soon to vaticinate, inasmuch as it seems certain that, in the coming struggle, the old lines of demarcation between Conservative and Liberal will, to a great degree, be obliterated, and the issue will practically turn upon the question of sympathy for, or hostility to, the Government Slave Bill."

The *Times* of September 8, 1884, published a leader on the Emancipation question, but it took an utterly erroneous view of the two parties—Abolitionists and Emancipators—stating that the former wish to secure the slave gradual but full freedom, with efficient protection pending his definite manumission; and the latter, while setting him nominally free, would keep him in cleverly forged bonds. The *Times* refuses to believe the statements in a very able and lengthy letter by Mr. Walter J. Hammond, which appeared in its pages on September 3, and, taking as its text the then lately celebrated jubilee of the abolition of slavery in British dominions, speaks of slavery and the present crisis in Brazil in a manner which displays either absolute ignorance or wilful disregard of the real position of the various interests under consideration.

The result of the elections was the return of the Liberal party to power, with Senhor Dantas as Premier, who had stated, in February, that before he had accepted office his own views with regard to the institution of slavery were harmonized with those of the Emperor. The new Parliament assembled the 8th of March, 1885. The Emperor's speech announced the presentation of a Government bill for facilitating the Emancipation of slaves, and commended the measure to the earnest consideration of the representatives of the people.

The *South American Journal*, † in a leader, said—

"There are, however, two opinions on this, as on every other subject. Though, practically, all are agreed in desiring the removal of the blot of slavery. . . .

* The *South American Journal*, September 6, 1884.

† March 21, 1885.

some are most anxious to hasten its disappearance, and are even prepared to vote for its immediate abolition ; whereas others, notably the great planters, are perhaps naturally adverse to any sudden dislocation or disturbance of the existing order of things, being on the whole satisfied with the results of the free-birth law. The Conservatives, almost to a man, are advocates of gradual emancipation ; while the Liberals take opposite ground, maintaining that slavery ought not to be simply permitted to die of old age. They call for legislation for the earlier removal of this offence from their midst. But they are not unanimous. Vested interests have driven in a wedge and destroyed the unity of the party of action. Pocket is urging its old war against principle, with an advocacy that makes many political pervers. It is not, therefore, surprising to the students of human nature to know that the recent elections in Brazil have accentuated this fact, and that an appreciable number of Liberal deputies have been returned to vote against the policy of the Dantas Cabinet, upon which appeal was made to the sense of the country."

It was not, therefore, expected that the Dantas Cabinet would remain long in power, and, as was the case soon afterwards with the Gladstone Cabinet in England, it was overthrown by a trifling matter—upon a vote of censure and want of confidence proposed in consequence of some individual grievance. The vote was passed by fifty-two votes against fifty. The *South American Journal*,* in an article in which it shows the similarity between the two defeats, says—

"In both instances, however, it is evident that the real causes of defeat must be recognized in the existence of profound dissatisfaction on the part of the majority of the members of the respective Parliaments of Brazil and the United Kingdom."

As regards Brazil—

"The vote at Rio de Janeiro really meant that the representatives of the Brazilian people are not prepared to endorse the energetic emancipation policy of the Dantas Ministry."

Here the parallelism closed, as the Liberal Government of Dantas was succeeded by another Liberal Government, with Senator Saraiva as Premier. The Conservatives held a meeting on May 6, and decided to receive proposals of the Saraiva Government—*com moderação*—with moderation.

On May 12, the new Ministry presented their bill for the

* June 13, 1885.

gradual extinction of slavery. The following is an abstract of its principal clauses :—*

- I. A new registration of all slaves under sixty years of age (about one million), with age, occupation, etc.
- II. Fixed maximum valuations for the several classes, grouped according to age—\$1000 being allowed for slaves fifteen to twenty years of age (there are no slaves under fourteen years), and \$200 for sexagenarians ; the other values being the same as in Senhor Dantas's bill ; the value of females to be 25 per cent. less. Slaves to cease being worked after sixty-five years of age. Freed men over sixty to be supported by their masters.
- III. Emancipation of slaves by the Fund and by their own savings.
- IV. Formation of the Emancipation Fund : (a) by existing means ; (b) by an increase of five per cent. on all general taxes and duties, except export ; (c) by annual emission of Government bonds of \$6,000,000, at five per cent.
- V.-VII. The application and distribution of the Emancipation Fund.
- VIII. The localization of slaves.
- IX., X. Domicile and labour of freed men.
- XIII. Emancipations by will declared absolutely valid.

In the *Times* of June 19 appeared a letter from the Chevalier A. de Souza Corrêa, Secretary of the Brazilian Legation, on the Saraiva bill, which was commented upon in a most deplorable, unjust, and revolutionary leading article. It was written in the same strain as the previous leader of September 8, regarding the subject through the prejudice-darkened spectacles of the British and Foreign Anti-slavery Society, whose secretary, Mr. Charles H. Allen, had, on June 4 and 5, written a few panic-stricken lines, which appeared in the *Times*. The Chevalier de Souza Corrêa, after giving an epitome of the bill, and referring to the Emancipation Funds in particular, concludes—

"In that way, and aided by numerous private manumissions, granted gratuitously, Senhor Saraiva expects to hasten emancipation in Brazil, so that in 1892 there would be no more slaves in our country ; and, in the meantime, the great industrial revolution shall have taken place with as little friction as possible.

The *Gazeta de Noticias* states that the number of slaves in Brazil at the beginning of the year (1885) is estimated at

* Condensed from translation of the text of the bill.—*South American Journal*, July 11, 1885.

1,177,022 ; of whom 623,274 are males, 553,748 females, and 87,492 are over sixty years of age.*

The extraordinary session of the Brazilian Legislature having closed on May 19, the ordinary session opened on the following day, when the Emperor, referring in his speech to the Emancipation question, said—

“The gradual extinction of slavery, which was the special object of the extraordinary session, should continue to merit the greatest solicitude on your part. This question, which is bound up with the deepest interests of Brazil, demands a settlement which shall tranquilize our agricultural classes. I commit it, therefore, to your wisdom and patriotism.”

Dr. Ernesto Ferreira França, Advocate to the Council of State, in a letter dated Rio de Janeiro, August 22, which appeared in the *Times* of September 21, points out the difference between the bills of Dantas and Saraiva. He says, “The Cabinet of Senhor Dantas conceded indemnification as a favour, and that of Senhor Saraiva as a right.”

It is needless to refer in detail to the events which followed. The following telegrams will be sufficient :—

Rio de Janeiro, August 15.

Senhor Saraiva, the Premier, and the other members of the Cabinet have collectively tendered their resignation to the Emperor, owing to the hostility displayed towards their general policy by the majority of the Chamber of Deputies.

Rio de Janeiro, August 19.

Baron de Cotegipe, one of the Conservative leaders, has been charged by the Emperor with the formation of a new Cabinet, and has accepted the task.

Rio de Janeiro, August 20.

Baron de Cotegipe has succeeded in forming a Conservative Cabinet. The Baron is Premier and Minister for Foreign Affairs.

Dr. Ferreira França concludes the letter referred to above as follows—

“As I write, a political change has taken place. The Baron de Cotegipe is at the head of a new Cabinet, belonging to the Conservative party, after Liberal administrations for between seven or eight years. Senhor Saraiva, having passed the Slavery bill through the Chamber, aided by a coalition of

* For further particulars of numbers in each province, see *South American Journal*, May 16, 1885.

Liberals and Conservatives, considered it improper as a Liberal to remain in power, there not being a Liberal majority in the Chamber, and it being certain that the bill would meet with no opposition in the Senate."

[REUTER'S TELEGRAM.]

Rio Janeiro, September 25.

The Government bill for the gradual abolition of slavery has been passed (24th) by both the Senate and the Chamber of Deputies.

On September 28, 1885, the fourteenth anniversary of the passing of the Rio Branco law, the Emancipation of Slaves Act, received the Imperial sanction; it is known as the Saraiva law, the principal items of which I have already given. Within ten years it is supposed that slavery will have ceased to exist in Brazil. Before long it will be seen that a great victory has been gained; and although the Act is not perfect, and it cannot be expected that Abolitionists will be pleased with all its details, yet a sudden revolution or entire dislocation of the present order of things has been avoided, and the long-desired aim of freeing this vast empire as speedily as may be from the curse of slavery is now ensured by a gradual and peaceful process. *Deo gratias.*

Rio de Janeiro, January 15, 1886.

The elections to the Brazilian Chambers have resulted very favourably to the Conservatives, who will have a majority in the new Chamber. The position of parties is thus reversed, the Conservatives having been in a minority in the former Chamber.

The return of a Conservative Ministry to power in September last restored confidence, and I am informed that the state of affairs generally has since then greatly improved, while, with a Conservative majority in the Chambers, the outlook for the future is very satisfactory.

THE ORIGIN OF SAVAGE COMMUNITIES OR TRIBES BY DEGRADATION.

Some time ago, when studying evolution from the standpoint of the Christian religion, I was especially led to consider how vastly more numerous are examples of degradation and degeneration than are those suggestive of evolution, or the doctrine of a lower form producing a higher.

From generalizations I descended into details, and took one family, that of the crustacea, wherein I found that the general conclusions to which I had been brought were proved in the most convincing manner in that family.

It is impossible to do more, in this short note, than give a few instances of the application of the theory of degradation to the human species.

I contend that a man is a family with only one genus—*Homo*. In some regions of physical science, at least, there is a certain scope for speculation; but, unless we are to throw over one of the most important statements of revealed religion, we must believe that God created man upright. Therefore, the existing tribes or communities of human beings who are in the lowest condition as to physical and intellectual development, or as to religious or moral ideas, must represent degradation. The Duke of Argyll, in "Unity of Nature," says, that as the first men could not have been cannibals or indulged in infanticide, or the race could not have been increased, the existence of these two customs alone proves degeneration.

The most ancient fossil remains of man that have been found exhibit a very high type, both in physical development and intellectual capacity. There are no remains at present discovered which display as low types of the human race as those that now exist in Australia, Tierra del Fuego,* or the bushmen of South Africa, who are degenerated Hottentots. The fossil skulls, found in the limestone caves† near the valley of the Rio Paraopéba, Minas Geraes, are of the same type as the Indians of to-day, who are now, owing to the Portuguese settlement, being pushed away into restricted and distant areas. A condition of high mental development, which the fossil men present to us, does not necessarily represent a correspondingly advanced condition of civilization, refinement, or progress of the arts and sciences. It denotes

* That even the inhabitants of Tierra del Fuego can be raised, as they have been, through the labours of missionaries, Mr. Darwin has freely acknowledged. The name Tierra del Fuego was given by the discoverers, who, on approaching it, saw numerous fires in the native camps. This in itself points to a certain status in development far above that of the most intelligent animals.

† Some of the remains of bones found in these caves are to be seen at the Natural History Museum, South Kensington, London.

merely the possession of an intelligent will, capable of development, and enabled to profit by experience.

I maintain that man was created noble and pure, with vast and untold capabilities. Since his creation, man, left to himself, has but degenerated. Soon came that mysterious catastrophe which we call the Fall; and synchronously the promise of a wonderful Redemption, which, in course of time, was effected. Subsequent on the Fall came degeneration—degradation of the antediluvian world; degradation of the Israelites, as described in the Old Testament; degradation of the Hindoos from the original standard of their religion, with lofty aspirations and ideals; degradation of Mohammedanism, etc.; degradation of Christianity.

The same truth confronts us in the records of the rocks. We find always that new forms were introduced in their highest state, full of life and vigour. They worked out the object of their creation, and then either became extinct on the introduction of higher forms, or remain to the present day degraded, degenerated, depauperated, and comparatively scantily represented.

This is the origin of all savage tribes. As the struggle to gain the necessities for bare existence increases, so man degenerates. Driven out by stronger tribes, the weaker are forced to live under the most uncongenial conditions, *e.g.* the Eskimos, Australians, Bushmen, Tierra del Fuegians. These all now live in countries the most unfavourable, with surroundings the least conducive to existence, let alone to advancement.

Mr. Drummond, in "Natural Law in the Spiritual World," has pointed out that death means "the want of correspondence with the environment;" and that "the organism is but a part, nature is the complement." The nations of the temperate zones have, at least, an environment conducive to progress—grasses which produce food, *e.g.* wheat; animals capable of domestication; a climate where excessive labour is, at least, possible during a prolonged period. The four people I have referred to have none of these advantages, and so it is with the Indians on the Amazons.

On the introduction of a civilized community into the midst of uncivilized nations, the latter cannot come into correspondence with their environment; they either become extinct, as in the case of the North American Indians, who are a race of warlike hunters,

with no literature, but with a beautiful and complex language, or they become and continue a subjected and servile race, like the negroes or the Malays.

I came across, in Brazil, white men (the descendants of the Portuguese), negroes, and a few tame Indians; all of them Christians, living together under parallel conditions. Of the three races, though the whites are the most civilized, the negroes are physically the finest race and the most prolific. I met with some mulattoes, who were not only very intelligent, but also most scientific, and especially skilled in modern languages.

WEIGHTS AND MEASURES.

In Rio de Janeiro, and in other places which are more or less connected with foreign countries, the kilogrammetric and litric systems obtain; but up country, as I have repeatedly mentioned, the old weights and measures are still in force. For small weights the kilogram and its divisions are used, but for larger quantities the arroba is employed. In measures of capacity, the litre is occasionally used, but in general the other measures, which are detailed in the table below. In the stores, cloths and other products are measured by metres; but distances are always described in leagues, half leagues or quarter leagues. In land measurement, alqueires, braças, and palmas are in use.*

LONG MEASURE.

1 Palma	= 9 Inches.
1 Covado	= 0'66 Metres = 2 Feet 2½ Inches.
1 Braça	= 2'20 " = 7 " 2½ "
1 Legoa, or Legua	= 6,666'66 Metres = 4 Miles 246 Yards.

SQUARE MEASURE.

0'0484 sq. Metres	= 1 Palma.
0'4356 "	= 1 Covado.
0'7744 "	= 1 Jarda.
1'21 "	= 25 Palmas = 1 Vara.
4'84 "	= 100 " = 4 " = 1 Braça.
1,089 "	= 22,500 " = 900 " = 225 " = 1 Prata.
1,936 "	= 40,000 " = 1,600 " = 400 " = 1 Geira.
48,000 "	= 1,000,000 " = 40,000 " = 10,000 " = 25 " = 1 Alqueire.
150,000 "	= 312,500,000 " = 12,500,000 " = 3,125,000 " = 7812'5 " = 312'5 " = 1 Sesmaria, = 1 sq. League.

* I am indebted to Mr. George Maunders, C.E., of Ouro Preto, for notes from which I have compiled most of these tables.

CUBIC MEASURE.

0.9976 English Quarts	}	= 1.10 litres = 1 Prato.		
0.2494 Eng. Imp. Gall.				
1.9 English Quarts	=	2.13	„	= 1.94 „ = 1 Medida.
1 English Peck	=	9.0675	„	= 8.24 „ = 4.25 „ = 1 Quarto.
1 English Bushel nearly	=	36.27	„	= 32.96 „ = 17 „ = 1 Alquiere.

WINE MEASURE.

1 Barril = 21 Litres = 4.63 Gallons.

AVOIRDUPOIS.

1 Libra Brasileira	=	1.03 Pounds.
1 Aroba	=	16 Kilos. = 35.2 Pounds.
65 Tonnelades	=	65,000 Kilos. = 64 English Tons.

WEIGHTS FOR DIAMONDS.

4 Grãos	=	1 Quilate.
24 „	=	6 „ = 1 Escrupulo.
72 „	=	18 „ = 3 „ = 1 Oitava.
1 Oitava	=	$1\frac{1}{16}$ Drachm Avoirdupois.
104 Oitavas	=	1 Pound Troy.

Captain Burton* gives a list of "the old Portuguese gold weights still preserved." They are used in gold mining.

2½ Grains	=	1 Vintem.
5 Vintens	=	1 Tostão or Tustão.
32 Vintens	=	1 Oitava (= $1\frac{1}{16}$ Drachm Avoirdupois).
8 Oitavas	=	1 Onça or Ounce.
8 Ounces	=	1 Marco.
2 Marcos	=	1 Pound.

A slight discrepancy will be observed between this table and the preceding, as in the former 72 grãos make up the oitava, while in the latter 80 grains are specified. It may be that the *grains* are not the same as the *grãos*; but as to this I have no information.

THE DECIMAL SYSTEM.

The question as to whether England should introduce the decimal or metric system is one which is much debated. It is asserted that our present mode of reckoning is fragrantly unscientific. I cannot deal with the subject in detail, but may state that I consider the metre as a standard to be far too large. The foot is much more convenient.

* "Highlands of Brazil," vol. i. p. 205.

After a year's use of the metric system in Brazil, all my work being carried out thus, as the calculations, estimates, etc., had to be submitted to the Government, I do not consider that system a convenient one, especially for small quantities; but am of opinion that our duodecimal method has the advantage, both by facility of expression and simplicity in working.

The ease with which vulgar fractions can be worked out mentally is an advantage which the decimal system does not possess. I have never yet met any one who could perform the same feats of mental arithmetic with decimals that can be executed by fractions.

I was glad to find by the remarks of Sir Frederick Bramwell (President), at a meeting of the Institution of Civil Engineers (January, 1885), that he is in favour of our retaining our fractional system. As thus, my unworthy conclusions are endorsed by a man not only of the greatest experience, but possessed of a far-seeing, comprehensive, and scientific intellect.

COINAGE AND CURRENCY.

It may be asserted as a fact that the only coinage current in Brazil is copper. In Rio, the money consists of nickel tokens of one hundred reis and two hundred reis, some lately coined copper pieces value forty reis and twenty reis, and notes from five hundred reis upwards. Up country there is an abundance of the old copper eighty reis and forty reis pieces, issued in 1829, to which I shall refer later. Captain Burton remarks, "The older travellers were obliged to have a mule for the carriage of this Spartan coinage." It reminds one of the old time when Naaman "bound two talents of silver in two bags, . . . and laid them upon two of his servants." *

The coinage in circulation is as follows:—The old eighty reis and forty reis pieces of copper ($1\frac{5}{8}$ inches and $1\frac{3}{8}$ inches in diameter), most of them over stamped with their present values of forty reis and twenty reis respectively; the neat modern forty reis and twenty reis pieces, about the size of our penny and half-penny; nickel tokens of one hundred reis and two hundred reis ($1\frac{1}{8}$ inches and $1\frac{3}{8}$ inches in diameter); and silver is represented

* 2 Kings v. 23.

by two hundred reis and five hundred reis pieces, about the dimensions and weight of our sixpence and shilling. Of these latter, during the whole time I was in Brazil, I only possessed eight of the two hundred reis and three of the five hundred reis coins, which I preserved as curiosities. I have also seen one milreis and one two-milreis in silver, but only one of each, which were kept by the possessor as something extraordinary. The paper notes range from five hundred reis to five hundred milreis (five hundred reis, 1 milreis, 2, 5, 10, 20, 25, 30, 50, 100, 200 milreis, etc.). The filth of these greasy notes, as a rule, up to ten milreis, defies description.

The Government and the Bank of Brazil, which issues its own notes, are constantly calling in the older issues; series so and so, or estampa so and so, green paper, white paper, etc. If the notes be not presented by a certain time, five per cent., or ten per cent., or more, is deducted from their value, and after a given period they are valueless. Money matters are consequently very complicated, especially up country, where one may never hear of the proposed call until it is time to send the notes in. I suffered much inconvenience in paying my men, owing to this abominable practice, a method which has been set to work to add to the coffers of an impecunious treasury.

This paper currency is not redeemable, any one going to the bank or to the treasury with a bagful of notes to realize being presented with freshly issued notes.

The nomenclature of the money is different up country to what it is in Rio. The 40-reis pieces, new and old, are termed "cobres," coppers. The "pataca" is also a very common name; its value is 320 reis. Every small sum is there counted by cobres, patacas, or testões (a testão is 100 reis). The milreis is often called "deztões" (*i.e.* ten testoons). In Rio, small sums are often reckoned by vintens (a vintem is 20 reis).

Mr. John Armitage, in his "History of Brazil,"* refers to the depreciation of coinage in 1829, and "the enormous issue of copper" (which coins, as I have stated, form the bulk of the currency up country). He says, "This copper was, even in 1829,

* "The History of Brazil from 1808 to 1831," 2 vols. Smith, Elder, and Co., 1836.

current to any amount at three times its intrinsic value, and was freely circulated in all the various provinces of the empire. The inhabitants looked only to the amount stamped on the coin, without reflecting that if melted down it would not be worth a third of the sum for which they received it. Of course, it was impossible that the deception could be carried on for ever, yet it was an expedient for helping the Government out of their existing difficulties. . . . During the years 1828 and 1829, nearly six thousand contos (*i.e.* six millions of milreis) of this base copper were coined and thrown into circulation."

The Government was then in difficulties, and it has never been otherwise. It is in vain for interested persons to contend against facts, and state that Brazil is increasing in prosperity. The expenditure fifty-five years ago exceeded the revenue—it does so to-day; and new loans are continually floated, externally and internally, to pay the interest on former liabilities, and on guaranteed undertakings, such as railways, sugar factories, etc.

The value of the milreis is steadily decreasing. When I arrived at Rio de Janeiro in June, 1883, I exchanged at $21\frac{1}{2}d.$ of the milreis; about January, 1884, it reached $22\frac{1}{2}d.$ for a short time; but in June and July, it was down to $20d.$; on April 26, 1885, it was $17\frac{1}{2}d.$ "Travellers assure us that in 1801 this (milreis), the practical unit of value, was worth 5s. $7\frac{1}{2}d.$ In 1815 it represented six francs twenty-five centimes. In 1835-36 it was from $30d.$ to $32d.$ " Gardner states that in 1838 it was $30d.$ Captain Burton says, "When I landed at Pernambuco (June, 1865) it was at par— $27d.$ It has in 1867 fallen to $13\frac{1}{2}d.$ [that was owing to the Paraguayan War]; and under actual circumstances there is apparently nothing to prevent it sinking, like the dollar of the South American republics, to twopence." * Mr. H. W. Bates states † that the current money on the Amazons varied much during the eleven years of his stay. "At first, nothing but copper coins and Brazilian treasury notes, the smallest representing one thousand reis ($2s.$ $3d.$), were seen. Afterwards (1852-56), with the increase of the india-rubber trade, a large amount of specie was imported—American gold coins, Spanish and Mexican dollars,

* Captain Burton's "Highlands of Brazil," vol. i. p. 91.

† "The Naturalist on the River Amazons," vol. ii. p. 75.

and English sovereigns. These were the commonest medium of exchange in Para and on the Lower Amazons, until india-rubber fell suddenly in price in 1855, when the gold again quickly disappeared. About the year 1857, new silver coin, issued by the Brazilian Government, was introduced—elegant pieces of money of convenient values, answering nearly to our sixpenny, shilling, and two-shilling pieces."

THE FINANCIAL CONDITION OF BRAZIL.

In reading statistics of foreign moneys there is always the difficulty of realizing at a glance what the sums represent in English currency. In Brazilian money this difficulty may be reduced to a minimum by taking the milreis (\$) at 24*d.*, so that the English equivalent in pounds sterling will be approximately one-tenth of the amount in milreis.

The few remarks which I wish to make on this subject I will defer till the end of the note, and therefore, without further preamble, plunge at once *in medias res*, and give some extracts from a pamphlet, "On the Budget of the Empire since its Foundation," published in Rio by a senator.* In his preface, he states that "an estimate is the fundamental basis of the life of man and of nations; without order in the regulation of expenses, confusion will be inevitable, and these will not be in harmony with the income. The first care, therefore, in arranging the budget is to attend to the *receipts*, and then distribute the *expenses*. . . . Unfortunately, this is not the course followed since the foundation of the empire, which, in spite of not having received the value of heavy sacrifices of life and money, has—ignoring these—caused extraordinary expenses, which not only weigh down the budgets, as also the future of the nation, but necessitate stretching out the hand of a creditor to fulfil its engagements. . . . I shall examine into the truth of the budgets, so often praised in the ministerial programmes, and always tricked (*burlada*) in their realization."

After briefly reviewing the financial conditions of England, the United States, France, and Russia, Senhor Carreira comes to Brazil. In his comparison of estimates, the value of the milreis is

* "O Orçamento do Imperio desde sua fundação," colleccionada pelo Senador Liberato de Castro Carreira. Rio de Janeiro, 1883.

taken at 27*d*. Beginning by a condensed statement concerning the proclamation of independence, the early days of the empire, the finances, and some of her brilliant financial statesmen, he then proceeds to give a classification of the Budgets from 1823.

I wish especially to draw attention to the ever-increasing receipts, as well as to the rapid growth of expenditure.

		Receipts. Milreis.		Deficit. Milreis.
In 1823	...	3,802,434	..	900,000
„ 1827	...	11,025,427	...	816,863
„ 1829	...	13,808,928	...	5,462,717

Senhor Carreira then enters into details of various changes which took place, loans issued, etc. A table of the various internal and foreign loans will be found at the end of this article.

	Receipts. Milreis.	Deficit. Milreis.	Balance. Milreis.
Jan. 1830 to June 1831 (1½ years)	17,644,322	3,535,793	
June 1831 to 1835 (4 years) ...	60,826,064		12,362,732
1835-1840 (5 years) ...	72,202,733	18,137,131	
1840-1845 „ ...	94,277,747	36,672,586	
1845-1850 „ ...	132,922,434		625,428
1850-1855 „ ...	176,376,689	6,230,993	
1855-1860 „ ...	228,265,099	8,766,521	
1860-1865 „ ...	262,957,589	39,291,244	

“All the Budgets of this last quinquennial were liquidated by deficits, and although this is scarcely a praiseworthy proceeding, especially as it is the usual occurrence, then at least it was justified by the disastrous and terrible war which, for six years, was carried on with Paraguay, consuming precious lives and a vast capital, which, applied to the improvement of the country, would have vastly assisted its progress and advance. The expenses of the Paraguayan War amounted to 613,183,262 milreis, which, constituting a debt from that nation, will require a long time for its repayment.* To meet the deficits, loans were opened to the amount of 23,995,849 milreis, beside the emission of paper currency.”

	Milreis.		Milreis.
1865-70 Receipts ...	376,891,018	Deficit ...	324,308,486

Besides extraordinary loans of 297,901,467 milreis, paper money was again issued to the extent of 23,389,505 milreis.

* In 1885 this debt has been reduced to 256,049 milreis.

	Milreis.		Milreis.
1870-75	Receipts ... 514,253,712	Deficit ...	56,612,024
1875-80	„ ... 537,447,569	„ ...	208,226,626

“This was again liquidated by ‘deficits,’ to supply which the Treasury issued extraordinary credits of 194,252,405 milreis, which were made up by a fresh emission of paper currency, apolicies of public debt, and a new national loan was opened, payment in gold, by the decree of July 19, 1879, to the amount of 50,000,000 milreis. In 1875, another loan of £5,000,000 had been contracted in London, at the price of 96½, with interest at five per cent., giving a nominal value of £5,301,200, producing 47,122,366 milreis.” About the time this pamphlet was published, another loan (1883) of £4,000,000 was issued, paying four and a half per cent. interest. A further loan of £6,000,000, 5 per cent. bonds, at 95 per cent., was brought out March, 1886.

Senhor Carreira continues, “In these five years (1875-1880) two principal causes influenced the augmentation of expenses. First, the calamitous period through which the northern provinces passed, chastened by three years of drought, which, beside the misfortune of losing thousands of lives, took 61,552,915 milreis from the public coffers; of this amount 30,814,136 milreis was spent in the province of Ceará, which was also assisted on a large scale by public charity. The second cause was the undertaking of public works, amongst which was that of increasing the canal for conveying water from the Rio do Ouro, authorized by the decree of September 22, 1875; and others, for the provision of water for the capital of the empire, on which 23,524,637 milreis were spent, a work which is not yet completed, and which will doubtless demand more expenditure in forthcoming Budgets.” *

After describing the various ways in which the moneys expended on colonists have been entered in the Budgets, Senhor Carreira states that the total expenditure under this head up to 1880 amounts to 48,683,521 milreis, “a sacrifice from which the country has not derived the advantages it hoped for. Several methods were tried in this work—all ineffectual—to produce what was desired, so that, at length the Government was convinced of the

* I have referred to the new reservoir, which I saw being constructed.

inutility of official or paid colonization, limiting itself to favouring spontaneous colonization with a grant for a limited period, and facilitating emigration or settlement (*internação ou colocação*).” *

After entering into particulars of the foreign and home debt, Senhor Carreira states that “The deficit is represented by the general debt of the empire to the amount of 660,366,200 mil-reis; and paper currency, *which is also a debt*, to the amount of 189,199,591 mil-reis. No doubt such a debt as 560,000,000 of mil-reis (£56,000,000), which presses upon the responsibility of the Treasury, is enough to make one unquiet; it is money which it is necessary to return to those who lent it under certain conditions, with which it was received. . . . Confiding in the annual increase of the receipts, annulled by the increasing expenditure, the defaulting Budgets are charged with credits beyond the estimates and extraordinary resources of the Treasury, such as deposits of economic trusts, the money of orphans, and not unfrequently, the pernicious custom of paper currency, and the credit to raise loans either national or foreign.

* Immigration. The system hitherto pursued by the Minister of Agriculture appears to have been on the happy-go-lucky style. There is, no doubt, a grand field for immigrants; but it would, at least, be advisable for the Governments of the various countries who wish to encourage some of their fellow-countrymen in emigrating to Brazil to combine in requiring certain guaranteed legal rights, such as those, for instance, mentioned in the *Rio News*, of October 5, 1885:—

- “ I. The grant of every civil and political right enjoyed by the Brazilians.
- “ II. Full religious liberty.
- “ III. Local government, uniform taxation, and exemption from the unjust competition of slave-labour.
- “ IV. A definite system of land surveys, unrestricted choice in selection of lands, low prices, registry of titles, abolition of six per cent. tax on transfers, and full legal protection of all property rights.
- “ V. Abolition of export taxes, and a uniform tax on land.
- “ VI. A reduction in the transportation rates, together with a public highway system, to facilitate the profitable marketing of agricultural products.
- “ VII. An effective public school system.
- “ Let it be once known among the emigrating people of Europe that there are good homes to be procured in Brazil on easy terms, that their lives and property here are secure against any and all usurpation, that a livelihood here is easily obtained, and that their children will have all the opportunities for education and advancement that can be found in any other new country, let this be known, and they will come of their own accord.”

"The state of the estimates, therefore, becomes worthy of the attention of statesmen, when one knows that, of the amount spent, the country has not a capital of over 300,000,000 milreis employed on productive works, its expenditure having been on administration or unproductive expenses.

"The necessity of sacrifices for developing a new country is ignored by no one. It is allowed, and should be; but it is better to execute the development in the orbit of its faculties than to compromise a future which, capable of being prosperous, is embarrassed. He who runs grows weary, he who walks obtains his end.

"To show that this duty has not been forgotten, it is sufficient to note the progressive allowance to the Minister of Agriculture, whose expenditure shows public works either belonging to the State or auxiliary to its operations, which represent the progress of the country. . . . The guaranteed interests to industrial undertakings amount annually to 1,763,420 milreis; that of grants to navigation companies is estimated at 3,299,600 milreis. Telegraphs, railways, and other improvements show anxiety and endeavour to accompany the progress of other nations; *but one should not lose sight of the fact that one quarter of the receipts of the Budget is destined for the payment of the State debt.*

"*The ease of having recourse to a loan constitutes the sore point (chaga) in the finances, and therefore, when some embarrassment appears, it is not attempted to be solved by economical measures, cutting down expenditure, or delaying expense which might be put off; they prefer to liquidate by a loan; therefore, says Laveleye, credit (which we were taught to bless as a beneficent fairy, who increases the well-being of humanity) becomes a worse scourge to nations than the plague and famine of the Middle Ages; because those were transient, and the other is permanent.**

"Whoever pays any attention to the increase of the estimates is soon confronted by the augmentation of officialism (*funcionalismo*). This is a cancer which devours and destroys the powers of the country, prejudicial not only by the increasing augmentation of expenditure, but by the disorganization of the service. The greater the number of those employed, the less is the amount of

* The italics are mine.

useful work. The few who work are interrupted by the many who disturb. Of old, the work was simplified by doing away with too many employés ; to-day, it is increased by the complication which is given to the service.* And yet this is not all. There is not an employé who does not consider himself ill-paid ; all grumble and cry out for an increase of pay, and the less they do the more they complain.

“To the officials is added the class of hangers-on, who will not pass unprovided in the abuse which has been given to that guarantee which the law reserved to the employé disabled by work or hoary in the service ; the amount desired by hangers-on is greater than that destined for the payment of all the employés of the imperial offices. . . . The class of pensioners deserves no less attention ; it consumes 1,793,915 milreis.

“Important questions on economic administration occupy the attention of divers commissions, who were entrusted by the Government to study them. We are accustomed to see the results kept among the archives, hardly serviceable to assist by their information (*de suas luzes*) those who have the curiosity of consulting them. We give our votes that the new studies shall not be of the same kind as the former.

“There are, however, two questions which appear to us cannot be adjourned either by Parliament or the Government.” Senhor Carreira then enters into the questions (1) of the withdrawal from circulation and reduction of the claims of the six per cent. and five per cent. apolicies or bonds, and (2) of the Bank of Brazil, which has power to circulate private notes ; and demonstrates how much revision and improvement is necessary in these matters.

He concludes his pamphlet thus :—“In ending this work, which is only an essay on the general condition of the estimates, I have brought together. . . . statements for understanding the financial history of the country, giving bases for its study in detail ; but I will not terminate without a reflection produced by this study.

“In the fifty-four Budgets liquidated, that is, after knowing all the receipts and expenditure, scarcely ten reveal a balance, and

* Brazil, with a population under 10,000,000, has 88,000 Government officials !

that so small in relation to the great deficits that it entirely disappears. This speaks so convincingly that he only deceives himself who does not desire to pay attention to it. It cannot, then, be said that this is a prosperous State ; and if we are not so selfish as to pretend to rejoice over the resources of the future, with the facts of the present, while continuing extraordinary expenditure, we must rest for a time, busying ourselves to reconstruct our weakened forces. The Chambers and the Government should combine not to create works which depend on fresh expenditure, whether permanent or temporary, and should attend to the necessities of the country, with the necessary criterion of entertaining only the indispensable.

"The spirit of the Brazilian Parliament bears some resemblance to that of France, as to the enthusiasm with which it faces the resources of the country, and voting expenditure while never consulting the true condition. Between France, however, superabounding in industry and commerce, and Brazil, rich in natural gifts, but poor in industry, having its gaze only fixed on a husbandry which is preparing for the sacrifice of a great change by the transformation of its slave-labour, and without great hope of this being solved without a crisis, the difference is extraordinary. Great social and economic problems are not solved by enthusiasm ; they require calmness, prudence, and reflection, which are elements constituting the well-being of nations.

"(Signed) SENATOR CASTRO CARREIRA.

"Rio, April 26, 1883."

I hardly consider it necessary to apologize for quoting at such length the opinions of another, which are given with the authority of one who really knows the details of the subject. It is a trite saying, that statistics can be so arranged as to prove anything ; but it would, I humbly submit, take a clever man to work out the items I have given so as to prove that Brazil is a prosperous country, or even that she is advancing financially, as the yearly increasing receipts are overshadowed by a yet greater expenditure. When one considers the yearly deficits, and how the Government of Brazil meets them—by continual issues of paper money, by bonds, by internal and foreign loans—it does appear a marvel that

the confiding public should advance money for the purpose of paying the ever-increasing deficits of an extravagant and impecunious country. Certainly, Brazil has not as yet repudiated her debts; but the payment of interest is out of capital.

It is considered by many in Brazil that the existence of the empire depends upon the life of one man—the present far-seeing, admirable, intellectual, and scientific Emperor; a man whose personal and domestic relations as husband and father are irreproachable. But at his death the future of the empire is far from being secure. The question, therefore, arises, What is the security of Brazilian stocks? Is the outlook good for investors? The answer from every conscientious Englishman in Brazil is an emphatic *no*. The present system has been undeniably bolstered up; by whom, does not signify; but I think it sufficient to draw attention to the foregoing pages to prove the truth of this statement. Why are Brazilian stocks so high when she has only a paper currency, while the northern republics, with Uruguay, the Argentine, and Chili, all of which have silver, are not held in such high repute? The whole fabric of Brazilian finance rests upon a very frail foundation, and, should there not soon be a material and radical change in the tactics of that empire, the investors in her stocks may find themselves ere long—though I hope the day may be long deferred—in a sorry plight.

NOTE TO PAGE 287.

Slavery in Ceará.

The *Rio News* of February 24, 1886, referring to the *Jornal do Commercio* of February 21, states that “to the infinite shame of” the Province of Ceará, “and to the bitter humiliation of every honest abolitionist, it now appears that a gross deception has been practised, and that Ceará is not entitled to the honours awarded” on the occasion of the enthusiastic reception of the news that Ceará was the first free province of the Empire. “According to the *Jornal*, the municipality of Milagres then possessed 300 slaves which were not redeemed, and of which 298 are in slavery down to this very day. . . . With this deception before us,” even should these slaves be liberated, “we shall not be able to free ourselves from the fear that there may still be men there from whom the shackles of servitude have never been stricken.” The inhabitants of Ceará have not only “discredited themselves before the world, but they have done a thing which cannot fail to still further discredit the sincerity and trustworthiness of the Brazilian people.”

TABLE SHOWING REALIZED LOANS.

Date of Decrees which authorized the Loans.	Real value.	Price.	Interest.	Nominal value.	Currency of the country.
External debt :—	£		Per cent.	£	*
Decree of January 5, 1824.....	2,999,940	80	5	3,686,200	32,766 : 631 \$ 800
Convention of August 29, 1825.....	1,400,000	...	...	1,400,000	12,444 : 600 \$ 000
Decree of December 27, 1828.....	400,000	52	5	769,200	6,837 : 418 \$ 800
Decree of October 26, 1838.....	312,512	76	5	411,200	3,655 : 156 \$ 800
Convention of July 22, 1842.....	622,702	85	5	732,600	6,512 : 081 \$ 400
Decree of March 13, 1852.....	954,250	95	4½	1,040,600	9,249 : 893 \$ 400
Decree of February 11, 1858.....	1,425,000	95	4½	1,526,500	13,569 : 058 \$ 500
Law of September 23, 1857 and 1859.....	508,000	par	5	508,000	4,515 : 612 \$ 000
Decree of August 24, 1858 and 1860.....	1,210,000	90	4½	1,373,000	12,204 : 597 \$ 000
Law of September 27, 1860 and 1863.....	3,300,000	88	4½	3,855,300	34,269 : 761 \$ 700
Law of June 26 and 27, 1865.....	5,000,000	74	5	6,903,600	61,899 : 440 \$ 400
Law of June 28, 1870 and 1871.....	3,000,000	89	5	3,423,200	30,428 : 824 \$ 800
Law of June 17, 1871 and 1875.....	5,000,000	96	5	5,301,200	47,122 : 366 \$ 800
Law of October 30, 1882 and 1883.....	4,000,000	89½	4½	4,590,600	40,885 : 844 \$ 400
Internal debt :—					
Decree of September 15, 1868.....	30,000 : 000 \$ 000	90	6	.....	33,334 : 600 \$ 500
Decree of July 19, 1879.....	50,000 : 000 \$ 000	96	4½	.....	51,885 : 000 \$ 600
Decree of November 15, 1827.....	Treasury bills of {	...	6	.....	339,069 : 100 \$ 000
Inscribed debts.....	.....	...	5	.....	2,158 : 000 \$ 000
	.....	...	4	.....	119 : 600 \$ 000
	.....	...	...	.....	143 : 022 \$ 424

* In these items, e.g. 32,766 : 631 \$ 800, the : represents *centos* of reis. As in India rupees are counted by *lakhs*, so in Brazil milreis are counted by *contos*. A conto is 1,000 milreis or 1,000,000 reis.

POSTSCRIPT.

The following are extracts from an article on the "Brazilian Budget," which appeared in the *Statist* of August 8, 1885.

"The Budget of the Brazilian Minister of Finance, presented to the Chambers in May last, is an elaborate document of over 400 quarto pages, and additional tables, etc., of about equal extent. The mixture of ordinary and extraordinary revenue and expenses, balances from previous budgets, deposits, and extraneous matter in the estimates is most bewildering; but reckoning the ordinary and extraordinary items together, the deficits may be placed at an average of about 26,000,000 milreis for each of the three years ended June 30, 1885. The result for 1883-84 showed a deficit of 23,762,967 milreis. The expected deficit of 1884-85 was 29,824,000 milreis, and the Minister in his explanation, as recently as last month, said he adhered to the estimates of revenue. The estimated excess of expenditure over revenue in 1885-86 was placed at 19,362,000 milreis, and for 1886-87, the forecast is of a deficit of 17,869,000 milreis. The estimates were qualified when made by the supposition that the revenue should not exceed nor the expenses be reduced on the estimates. According to Mr. Sandford's report, referred to in the *Statist* of April 4 last, between 1873-74 and 1882-83 inclusive, the deficits had amounted to some 288,000,000 milreis, or an average of 28,800,000 milreis, and they had been met by the creation of 71,000,000 milreis in Treasury bills, 129,000,000 milreis in internal loans, 80,000,000 milreis in foreign loans, and 40,000,000 milreis by issues of notes. The more recent deficits have been met by further creation of Treasury bills, and the extension of the note circulation is contemplated. Efforts have lately been made to effect economies in expenditure, but the results are not so great as could be desired.

"The comparison of revenue and expenditure for 1881-82, with the estimates of 1885-86 and 1886-87, is as follows:—

	1881-82. Milreis.	1885-86. Milreis.	1886-87. Milreis.
Receipts ...	128,937,620	131,663,400	132,881,600
Expenditure ...	156,749,546	151,025,977	150,751,017

"The Senate and deputies have, it is stated, agreed to the bill to authorize the issue of 25,000,000 milreis of notes. The banks,

in their balance-sheets of June 30, show that the Government owes them just 60,000,000 milreis, viz. :—

	Milreis.
On Treasury bills (old and new issues)	55,524,000
Account Current with Bank of Brazil	4,198,638
	<hr/> 59,722,638

“ . . . The bills discounted and the call loans at the bank tend to decrease, for the necessities of trade cannot resist so powerful an antagonist as the Treasury. The actual cash in the seven banks is returned as 11,214,587 milreis. This cash is an asset against deposits on call, and with fixed maturity of no less a sum than 127,667,000 milreis.”

The *Rio News* says, “The Treasury of the empire of Brazil has now reached a point when little short of a miracle can relieve it, if its authorities continue to follow the same beaten road.”

REPORT OF THE BRAZILIAN FINANCE MINISTER.

The *Rio News* gives some interesting extracts from the last report of the Finance Minister of the empire,* from which I make the following notes :—The minister proposes additional taxation—(1) on lands served by railways and river navigation ; (2) on agents, directors, or managers of companies, pawnbrokers, slave-dealers, dealers in lottery tickets, and various other occupations, and on certain factories ; (3) on tobacco ; (4) an increase of from forty to fifty per cent. on stamp duties and charter companies. “The minister does not agree with the proposed increase of ten per cent. on imported wines, etc., which are already heavy, and *because the proposed addition would further stimulate the manufacture of artificial wines, spirits, etc., which have already flooded (invadido) the markets of the capital and provinces to the manifest prejudice of the public health.*† Therefore, what should be done is to impose a tax of one hundred reis per litre on the produce of these factories,

* *South American Journal*, July 25, 1885.

† The italics are mine. Would that all English statesmen recognized the increase of this evil in our midst, to the prejudice of the legitimate wine and spirit merchant, as well as to the injury of the health and vitality of the nation.

which, under careful fiscalization, would give an annual sum of over one million milreis to the Treasury."

The report gives the following particulars as to the present condition of the foreign and home debt :—

FOREIGN DEBT.

	£
Loan of 1860	137,900
„ 1863	1,108,400
„ 1865	4,968,600
„ 1871	2,865,800
„ 1875	4,795,400
„ 1883	4,543,800
Total	£18,419,900

INTERNAL DEBT.

	Milreis.
Apolicies at 6 per cent.	336,003,100
„ 5 „	1,997,200
„ 4 „	119,600
Gold Loan of 1868, 6 per cent.	22,443,500
„ 1879, 4½ „	42,777,500
Total	403,340,900

Orphans' Fund	15,831,303
Estates of deceased and absent persons	3,842,591
Emancipation Fund	2,735,355
Savings Banks	18,478,818
Mont de Pieté	790,287
Sundry deposits	11,161,108
Treasury bills	50,075,500
Treasury notes	10,728,000
Paper money	187,343,725
Exercicios Findos	411,671

The assets of the Treasury are :—

Unpaid taxes	14,976,300
Debt of Uruguay	17,007,036
Debt of Paraguay	256,049

APPENDIX II.

A SEVERE WINTER IN MINAS GERAES.

I HAVE mentioned that the inhabitants of Brumado, in Minas Geraes, told me of the extraordinary frosts of the year 1870. I now give some details thereof, translated, by special permission of the author, from M. Emmanuel Liais's very valuable book.*

"On the high table-lands of Minas Geraes, between São Paulo, Barbacena, and the extensive mountains in the neighbourhood of Ouro Preto, whose heights range from nine hundred to eleven hundred metres, the mean temperature is on an average 5° centigrade below that of sea level on the same parallel, and, owing to the difference of latitude, about 4° centigrade below that of Rio de Janeiro. At Atalaia, near the last-named city, the lowest temperature given by my minimum thermometer, under good conditions of free access to air and guarded against radiation, has been 10·8° centigrade, and that is in one year only. Generally the yearly minimum never went below 12·5° centigrade. . . .

"Real frost was quite unknown on the highlands, nonagenarians never remembered having seen any, and were astonished when, in the month of June, 1870, this phenomenon was produced with an extraordinary intensity for those regions. This time the frost was very persistent, and lasted five or six days, from Barbacena to the Serras of Ouro Branco, in all the eastern boundaries of the central highlands of Minas. This phenomenon was local, limited, unaccompanied by abnormal temperatures in other regions of Brazil not far distant. I was then in the centre of the province of Bahia, where the temperature was as high as usual ;

* "Climats, Géologie, Faune, et Géographie Botanique du Brésil," p. 584, et seq.

and after my return to Rio de Janeiro, I found, in the following August, the index of my minimum thermometer $12\cdot5^{\circ}$ centigrade above zero, which thus showed me the lowest temperature at Rio de Janeiro for about a year (since my departure), and assured me also, that in Rio nothing abnormal in the temperature had existed during the extraordinary cold of Minas Geraes.

"However, the cold at Barbacena had been sufficiently intense and prolonged to enter the houses, where water froze. In this country, it is true, the houses have not as thick walls as in cold countries, chimneys are wholly unknown, and cooking is done in ovens. These conditions are amply sufficient for ordinary winters, for the low temperatures of from 3° to 4° centigrade above zero (32° Fahr.) . . . are only towards dawn, and have not time to penetrate to the inside. After sunrise, the temperature rises again very quickly, and these circumstances explain the absence and uselessness of chimneys in the rooms. But, at the same time, they show how abnormal was the phenomenon with which we are now occupied, and explain the ease with which frost can enter the dwellings. The Visconde de Prados was at Rio at the time of the phenomenon; but on returning to Barbacena in the month of August, he found that the minimum thermometer placed in his drawing-room (which had remained closed) registered $29\cdot5^{\circ}$ Fahr., that is, $1\cdot5^{\circ}$ centigrade below zero. This indicates how intense and prolonged the cold must have been outside. The French vice-consul at Barbacena, M. Renault, told me that the thermometer on the last day went down to nearly 6° centigrade below zero, outside; but this temperature only lasted for a very short time. Nevertheless, evidently the temperature must have remained some time at from 2° to 3° centigrade below zero during this last night, otherwise the thermometer could not have gone down to $1\cdot4^{\circ}$ centigrade under melting ice, inside a closed frame; and, again, this was only explicable by the extreme low temperature which had already existed for several days, when, on preceding nights, the thermometer had been a little below zero (32° Fahr.). Some sugar-cane plantations were destroyed, streams were frozen, and many dead fish were observed. Some forests were entirely frozen, as if they had been scorched by fire, and many young trees perished. Many persons also fell victims to the cold, in the open

country, where the "tropeiros," or mule-drivers, are barely covered with cotton clothing, and often lie under open sheds, or even outside.

"At first sight, the explanation of this abnormal phenomenon is difficult, for the lower lying currents of air (*vents inférieures*), coming from the far-distant southern regions, cannot reach these latitudes at a low temperature, as they are warmed along the whole of their course by contact with the soil under the influence of solar radiation. A direct descent of cold air from the higher regions of the atmosphere cannot take place without a considerable increase in the heat of that air, in virtue of the compression it sustains (*compression éprouvée*), and consequently one cannot have recourse to the pure and simple hypothesis of an atmospheric current descending, especially as the phenomenon in question would then be frequent. The only possible explanation is, therefore, to admit that in a much more southern latitude, where, consequently, the winter might be very severe (*pouvait sévir avec rigueur*)—for the month of June is a winter month in the southern hemisphere—a great mass of cold air, at a temperature far below zero (centigrade), and due to a very strong radiation from the earth's surface and to southerly winds, was carried, by a cause whose origin we will presently examine, to a great height above the surface. By expansion, owing to such an elevation, its temperature was again lowered to a great extent; but this would once more attain its original condition if the mass of air descended again to its former level. Then, driven northwards at its high elevation, the current approached the equator without becoming much warmer, contrary to what would have happened had it passed over the soil, for the solar rays raise the temperature of the air in passing along, and we know that, above all, it is warmed by going over the soil, and by the ascending currents which its passage occasions. But, on approaching the latitude of the table-lands of Minas Geraes, this cold mass of air descended to the level of the plateau, and the warming resulting from the descent could only bring back its original temperature, and even that only by supposing that it did not primarily come from a lower level than the plateau. Therefore, it could then have carried there a still lower temperature than its original condition, except the small increase gained

by solar rays in its course, and also a slight mixture with less cool strata of air.

"This being granted, one easily understands that, as at the extremity of South America, in latitudes where temperatures of 12° , 15° , or even of 20° below zero (centigrade) are occasionally possible in winter on the surface of the ground and near the level of the sea, a strong wind, that is to say, a great mass of air moving W.S.W. to E.N.E., beat against the mass of the southern Andes, where, by its acquired velocity, it ascended, still keeping its E.N.E. direction. . . . Then, in the higher current, its northerly movement was retained, and by terrestrial rotation it gradually lost its easterly direction, until, after a long westerly movement, it finally became a south wind. For this frozen wind to gain at once the latitude and level of the plateau of Barbacena, it is now sufficient . . . to meet favourable circumstances to extend northwards. . . . Thus we see that for this phenomenon there was needed a rare combination of numerous and fortuitous circumstances over a considerable journey."

I will next translate a few extracts concerning other meteorological phenomena; but space prevents my giving more than very short summaries, and excludes my detailing the causes, for which I refer those interested to M. Liais's exhaustive work.

HAIL.

"The hailstones are large, very hard, and I have seen them take three or four minutes to melt. In 1862, I observed four falls of hail in November. There are, according to the inhabitants, on an average twenty in a year. At Rio de Janeiro falls of hail are rare. I have only known four from 1858 to 1864, of which I saw three; and two others from 1865 to 1871. The first fall was on February 22, 1859, when there were only a few hailstones mixed with a heavy storm of rain. Two others were on October 22 and 30, 1863, during heavy storms, accompanied by thunder. The hailstones were lenticular. I measured some, eighteen millimetres in diameter, and one millimetre thick. They produced a general surprise; and I have seen persons of sixty years of age who never remembered having seen the like. But the fourth fall was the most remarkable. It occurred October 10,

1864, during a terrible hurricane, five days after the great hurricane of Calcutta, and after the extraordinary cold in France from October 2 to 4, 1864, consequently during a considerable atmospheric disturbance, whose action had extended to very distant parts of the globe. This fall was extraordinary, accompanied by a violent storm, and a wind by which, at certain places, venerable trees were uprooted. I was not then at Rio, but I knew that there occurred in that place hailstones as thick as one's thumb. Since that time there have been no heavy falls of hail (up to 1871), but only twice a few small hailstones in some storms. Hail may thus be considered as an exceptional phenomenon at Rio de Janeiro, and on the plateau of Minas Geraes as an habitual phenomenon. At the north of the empire, falls of hail are almost unknown."*

STORMS AND RAIN.

"Storms are excessively frequent in summer at Rio de Janeiro and in the province of Minas Geraes. There is sometimes magnificent lightning, not only bifurcated, but with a considerable number of branches; and the discharges are repeated occasionally, from the same point, seven or eight times in a second. The frequency of storms diminishes considerably on approaching the north. At Pernambuco, during eight months, I only saw lightning twice; and I have never heard thunder.

"In Rio de Janeiro, and on the coast of Espirito Santo, it rains every season of the year; but, as a rule, much more in summer, and less in winter. Generally, the driest months are June, July, and August. In the whole of the interior of Brazil, these months are always invariably dry, and the seasons divide into two: the time of rain from October to March, the dry season from April to September. . . . On the coast of Pernambuco, the rains are specially abundant in the months of June, July, and August, which are the dry months in the south." M. Liais enters at length into an explanation of this curious inversion of climate, which is briefly as follows:—From the lofty table-lands of the interior, when heated by the midsummer vertical sun, arise cur-

*. During the ten months that I was in Minas, I never remarked any hail accompanying the tremendous thunderstorms.

rents of hot air, and the moisture-laden currents from the sea rush in to take their place, passing over the lowlands and discharging themselves in storms on the elevated plateaux, which are near the sea at Rio, and far from it at Pernambuco. In winter, the reverse is the case.

MISTS.

"Mists" (*brouillards*; but I cannot call them *fogs*, as these are so mixed up with the idea of our smoky fogs) "are constant in the morning on the great rivers of the interior, and equally frequent in the morning, during the winter, near the coast, especially in the valleys and bays, as in the bay of Rio de Janeiro. Those on the banks of the rivers in the interior occur in the dry as well as in the wet season, and are due to the great excess of the temperature of the water above that of the morning air, an excess of 3° or 4° centigrade, the former sometimes rising to 60° centigrade. These mists sustain the vigour of the vegetation on the banks during the dry season, and the trees there retain their leaves. They lose them, on the contrary, away from the river-banks, owing to the dryness: and this circumstance even occasions a special riparian flora nearly approaching in its characteristics that of the virgin forests."

METEOROLOGICAL NOTES

In Minas Gerais, from August 18, 1883, to May 27, 1884. At Dolafogo, Rio de Janeiro, from May 30 to July 27, 1884.

TAKEN BY H. C. DENT.

NOTE.—The great pressure of professional work and other circumstances prevented regular observations before the beginning of October.

Date.	Fahrenheit.		Barometer.	REMARKS.
	Min. Thermometer.	Max. Thermometer.		
Aug. 18	...	...	Inches.	<i>At Casa Grande, about 3200 feet above the sea.</i> Very heavy rain all night. Fine day.
" 21	...	...	7 a.m. 26.72	
" 22	...	...	7 a.m. 26.90	
" 23	...	...	7 a.m. 26.95	6 p.m. 26.90. The Serra do Cortume clouded till 11 a.m.; then fine sunny day. Clouds began to descend at 5 p.m.; by 6 p.m. mountains quite hidden.
" 24	...	...	...	Clouds very low early, but fine by 11 a.m.
" 25	...	...	...	Very cold early; dense mist. Fine day.
" 27	...	...	...	Ditto ditto
" 28	...	...	...	Ditto ditto
" 30	...	...	...	Slight rain during night. Cold, cloudy morn.
Sept. 4	38°	110°	...	Cold, misty morning.
" 5	36°	120°	...	7.30 a.m. 42°, 5.30 p.m. 76°, 8 p.m. 56°. Cloudless day.
" 6	37°	...	...	7.45 a.m. 42°. Cloudless day. 6.30 p.m. 66°.
" 7	37°	110°	8 a.m. 26.90	8 a.m. 46°, 10 a.m. 86°.
" 8	39°	...	7 a.m. 26.73	7 a.m. 40°, 9 a.m. 86°.
" 13	...	106°	...	6 a.m. 42°, 8 a.m. 60°.

Camp near Serra d'Oitavas d'Agua (about 3200 feet above the sea),
7 a.m. 42°, 8 a.m. 60°.

Sept. 14	48°	...	...	8 a.m. 56°, 9 a.m. 76°.
" 15	50°	71°	...	Showers from 6.30 a.m. 7.30 a.m. 60°. No sunshine. Much rain, especially after 3.30 p.m. 8 p.m. 60°.
" 16	54°	62°	...	Cold and cloudy.
" 17	52°	128°	...	7 a.m. 56°. Cloudy all morning. Fine afternoon.
" 18	52°	92° shade	...	Very hot day, but breezes.
" 19	55°	...	...	Showery all night. Pouring incessantly from 9 a.m. till 2 p.m.
" 20	...	...	...	Very fine day.
" 21	48°	129°	...	Fine day.
" 22	48°	128°	...	Ditto.
" 23	52°	106°	26.85	Beautiful day.
" 24	44°	125°	...	Perfectly cloudless day.
" 25	...	...	...	Very hot and sultry.
" 26	...	...	...	Strong wind.
" 27	52°	125°	...	Perfectly cloudless day till 5 p.m. Heavy showers 5 to 6 p.m.
Oct. 1	52°	139°	...	Fine evening. Thunder and lightning.
" 2	49°	134°	...	Magnificent cloudless day.
" 3	55°	136°	...	Cloudless sunrise. Grilling from 10 to 2; then a few clouds and cool breeze.
" 4	...	116°	...	Cloudless day. 86° in tent at 11 a.m.
" 5	58°	110°	26.77	Cloudy and very cool morning. Sunshine 12 to 2; then cool afternoon. 10 p.m. 67°. Lightning as usual.
" 6	56°	132°	9.30 p.m. 26.85	At 4 p.m. 78° in tent. Cloudy and cool.
" 7	52°	11 a.m. 132°	26.84	Cool, cloudy. Thunder and slight rain. About an hour's sunshine during the day.
" 8	...	131°	...	104° at 8.30 a.m., 88° in tent midday, 70° in tent at 8.30 p.m., but cool. Great thunderstorm, deluge, during night.
" 9	62°	122°	...	Very sultry. Slight breeze.
" 10	58°	105°	...	Dull, drizzle. Sun at intervals. 6 p.m. 65°, cool.
" 11	...	104°	...	Very cold morning. Scotch mist. From 10 a.m. rather warmer.
" 12	62°	86°	...	Strong breeze, occasional sunshine all day. Much thunder, lightning, and rain all night. 62° at 5 p.m.
" 13	...	69°	26.75	Dull, overcast morning, with rain. Cool.
" 14	54°	73°	26.85	Much rain, night and day. Average, 64°. Much wind, very cold and miserable.
" 15	51°	59°	7 a.m. 26.85 9 p.m. 26.80	8 a.m. 58°. Cool, cloudy day. No sunshine. 8.30 p.m. 60°. 54° at 7 a.m. Cool, dull, windy, rain. Drizzle all day. 6 p.m. 54°.

Thunder and lightning every evening.

Date	Time	Wind	Barometer	Thermometer	Remarks
Nov. 1	6.00	SE	30.0	60.0	Heavy all night. Half cold, clouds at intervals. 4 p.m. heavy showers.
	6.10	SE	30.0	60.0	Cloudy, strong breeze. Showers and sun late during afternoon. Fine night, clear and moon, heavy dew.
	6.20	SE	30.0	60.0	Not any more clouds, no rain all night. 7 p.m. to 7.30 p.m. clear.
	6.30	SE	30.0	60.0	Fine morning. Fairly correct from 8 p.m. to 10 p.m. clear.
	6.40	SE	30.0	60.0	Clear night. Fairly correct from 8 p.m. to 10 p.m. clear.
	6.50	SE	30.0	60.0	Clear night. Fairly correct from 8 p.m. to 10 p.m. clear.
	7.00	SE	30.0	60.0	Clear night. Fairly correct from 8 p.m. to 10 p.m. clear.
	7.10	SE	30.0	60.0	Clear night. Fairly correct from 8 p.m. to 10 p.m. clear.
	7.20	SE	30.0	60.0	Clear night. Fairly correct from 8 p.m. to 10 p.m. clear.
	7.30	SE	30.0	60.0	Clear night. Fairly correct from 8 p.m. to 10 p.m. clear.
Nov. 2	6.00	SE	30.0	60.0	Heavy all night. Half cold, clouds at intervals. 4 p.m. heavy showers.
	6.10	SE	30.0	60.0	Cloudy, strong breeze. Showers and sun late during afternoon. Fine night, clear and moon, heavy dew.
	6.20	SE	30.0	60.0	Not any more clouds, no rain all night. 7 p.m. to 7.30 p.m. clear.
	6.30	SE	30.0	60.0	Fine morning. Fairly correct from 8 p.m. to 10 p.m. clear.
	6.40	SE	30.0	60.0	Clear night. Fairly correct from 8 p.m. to 10 p.m. clear.
	6.50	SE	30.0	60.0	Clear night. Fairly correct from 8 p.m. to 10 p.m. clear.
	7.00	SE	30.0	60.0	Clear night. Fairly correct from 8 p.m. to 10 p.m. clear.
	7.10	SE	30.0	60.0	Clear night. Fairly correct from 8 p.m. to 10 p.m. clear.
	7.20	SE	30.0	60.0	Clear night. Fairly correct from 8 p.m. to 10 p.m. clear.
	7.30	SE	30.0	60.0	Clear night. Fairly correct from 8 p.m. to 10 p.m. clear.

* Minimum thermometer destroyed by a dog.

Nov. 2	7 a.m. 65°	...	7 a.m. 26.725	Continuous rain. Fine rain 8 a.m. to 12.30, heavy at intervals during afternoon and evening, with thunder and lightning.
" 3	6.30 a.m. 56°	93°	6.30 a.m. 26.80	Dull morning. Fine afternoon. Rain set in at 5.30 p.m.
" 4	5 a.m. 55°	...	5 a.m. 26.86	Fine, with clouds, no rain. Glorious sunset.
" 5	...	120°	.....	Misty, cold morning; then cloudy, occasional sun. Grand evening, much wind. Superb sunset. Moon halo.
" 6	6.15 a.m. 61°	84°	6.15 a.m. 26.80	Dull. 11 a.m. steady fine rain began, which continued all afternoon and evening. Cool, pleasant.
" 7	6.30 a.m. 56°	75°	6.30 a.m. 26.76	Leadon sky, cold drizzle. Heavy rain 11-12. Slight sunshine; then dull afternoon and evening, occasional drizzle.
" 8	6.15 a.m. 62°	...	6.15 a.m. 26.73	Dull, cloudy morn. 11 a.m. cloudless, grilling. 4-5 p.m. heavy showers. Fine sunset.
" 9	6 a.m. 65°	95°	6 p.m. 26.64 6 a.m. 26.72	Rain 9-11 a.m.; Then cloudy, sultry. Warm afternoon from 2.30. Bright moon, halo, 7 p.m. Heavy thunder and lightning all round horizon. 9 p.m. thunderstorm.
" 10	6 a.m. 65°	116°	6 a.m. 26.70	Very sultry. Hot and steamy all day in woods. Sunset, cloudless zenith. Brilliant afterglow. Superb, cloudless moonlight night. 7.15 p.m. 65°.
" 11	7 a.m. 80°	120°	6.30 a.m. 26.78	Heavy mist 6.30 a.m. Glorious day, a few cumulus, soft breezes. Very stormy sunset, but no rain.
" 12	6 a.m. 67°	105°	6 a.m. 26.80 6 p.m. 26.70	Sunshine, occasional clouds, much breeze. No rain. Magnificent cloudless moon, nearly full. But few stars visible.
" 13	6 a.m. 65°	115°	6 a.m. 26.775 9 p.m. 26.775	Cloudless day. Afternoon a few cumulus and strato-cumulus clouds. Superb moonlight, balmy breezes.
" 14	6.15 a.m. 72°	...	6.15 a.m. 26.775	Cloudless morning. By noon heavy clouds; then much rain for over two hours.
" 15	6.30 a.m. 65°	112°	6.30 a.m. 26.75	Magnificent day, very hot and sultry.
" 16	6.15 a.m. 73°	...	6.15 a.m. 26.75 6 p.m. 26.55	Fine, no rain, very hot and sultry.
" 17	...	...	26.575	<i>Camp near Olhos d'Agua, about 3300 feet above sea level.</i>
" 18	8 a.m. 80°	100°	8 a.m. 26.55	Cloudy, sultry, thundery, with grilling sun at intervals.
" 19	6.30 a.m. 80°	112°	6.30 a.m. 26.60 10 p.m. 26.60	Sunny day. Thundery, with lightning in evening. Heavy rain during night. Much mist early. Overcast, dull, sultry morning. By noon hot sun, few clouds. After 2.30 p.m. continual heavy showers.
" 20	6.30 a.m. 67°	...	6.30 a.m. 26.625	Very heavy rain at night. Much mist early. Overcast, steamy day. After midday slight showers. Sultry.
" 21	7 a.m. 63°	87°	7 a.m. 26.60 3 p.m. 26.50	Much mist early. Cool, cloudy day. Heavy rain in the neighbourhood. Starlight night, late moon.

Date.	Fahrenheit.		Barometer.	REMARKS.
	Min. Thermometer.	Max. Thermometer.		
Nov. 22	7 a.m. 76°	120°	Inches. 7 a.m. 26.58	Magnificent day. A few clouds before noon. Afternoon cloudless, scorching sun. Cloudless evening. No rain. Heavy dew. 9 p.m. 57°.*
" 23	6.45 a.m. 67°	120°	6.45 a.m. 26.59	Cloudless, hot morning. Cloudy midday. Afternoon heavy showers. Starlight night.
" 24	6.30 a.m. 57°	119°	6.30 a.m. 26.59 5 p.m. 26.475	Very cold before daybreak. Heavy dew. Cloudless till 2.30 p.m.; then heavy storm, with wind. Much thunder and lightning.
" 25	7 a.m. 65°	120°	7 a.m. 26.53 7 a.m. 26.55 6 p.m. 26.50	Very cold early. Splendid day, cumulus, no rain.
" 26	7 a.m. 70°	121°	7 a.m. 26.50	Very hot till noon; then shower. Cool, cloudy afternoon.
" 27	7 a.m. 75°	109°	7 a.m. 26.60	Grand day, cool breeze. 6 p.m. heavy clouds and lightning surrounding horizon. 11.30 p.m. severest thunderstorm I have yet experienced, with wind.
" 28	6 a.m. 65°	116°	6 a.m. 26.70	Much mist, overcast morning. Sun at intervals. Very hot 12-3. Thunderstorms around 5-7 p.m.
" 29	6.15 a.m. 67°	75°	6.15 a.m. 26.675	6 a.m. sultry, overcast, no wind. Continuous deluges from 9 a.m. Cold, blustering, rainy night.
" 30	6.30 a.m. 54°	65°	6.30 a.m. 26.70	Cold, dull, grey morning. Continuous drizzle or rain from 7.30 a.m. till 2 p.m.; when wind increased and rain ceased. Drizzle set in again about sunset.
Dec. 1	6.15 a.m. 62°	121°	6.15 a.m. 26.75	6.15 a.m. clouds breaking. Cloudy morn. No rain. Fine, with very few clouds by midday. Grand afternoon. Breezy evening. Sunset about 6.45.
" 2	7.45 a.m. 68°	139°	7.45 a.m. 26.75 4 p.m. 26.65 9 p.m. 26.73	Grand day, cool wind, scattered clouds, very hot. Magnificent sunset. Afterglow. Starlight night. Lightning on horizon to N.N.W.
" 3	5.45 a.m. 60°	125°	5.45 a.m. 26.73 5.30 p.m. 26.65 10 p.m. 26.73	Sun rose at 5. Thick mist by 5.45, which dispersed by 8. Cloudy morn. Occasional hot sun. From 11.30 grilling, and almost cloudless afternoon. 4.30 p.m. sharp shower, with thunder-clouds. 9 p.m. starlight, lightning to N.N.W.

* A brilliant yellow light round the cloudless sun, foretells rain, which came on 23rd.

Dec. 4	6.45 a.m. 73°	95°	6.45 a.m. 26.70 6 p.m. 26.65 9 p.m. 26.75 6 a.m. 26.75 4.30 p.m. 26.65 9 p.m. 26.73 6.30 a.m. 26.73 11.30 a.m. 26.77 5 p.m. 26.79 9 p.m. 26.80 7 a.m. 26.85 4 p.m. 26.75 9 p.m. 26.80 7 a.m. 26.85 4 p.m. 26.80 9 p.m. 26.82 7.30 a.m. 26.83 6 p.m. 26.775 9 p.m. 26.80 6 a.m. 26.80 5.30 p.m. 26.75 9 p.m. 26.81 6 a.m. 26.78 5 p.m. 26.70 10 p.m. 26.775 6 a.m. 26.775 6 p.m. 26.70 6 a.m. 26.76 5 p.m. 26.675
" 5	6 a.m. 58°	90°	
" 6	6.30 a.m. 66°	85°	
" 7	7 a.m. 57°	67°	
" 8	7 a.m. 58°	64°	
" 9	7.30 a.m. 63°	98°	
" 10	6 a.m. 63° 5.30 p.m. 70° 9 p.m. 69° 6 a.m. 65° 5 p.m. 77°	110° 136°	
" 12	6.30 a.m. 66° 6 p.m. 60° 6 a.m. 62° 5 p.m. 66° 9 p.m. 58°	96° 132°	
" 14	6 a.m. 63° 5.30 p.m. 78° 9 p.m. 71.5° 6 a.m. 68° 5 p.m. 80° 9 p.m. 75°	126° 126°	
" 15			

Many heavy showers during night and early morning. Heavy clouds and showers all day, with thunder. Great storm, wind and rain, 6 p.m.

Much rain during night. 6 a.m. cold, windy, miserable. Heavy drizzle 7.30 to 8 a.m. Cool, breezy day. 9 p.m. 69°.

Cloudy, mild morning. Fine drizzle 7.30 to 8 a.m. Continual deluges from 10 a.m. to 1 p.m. Cloudy, dull, cool afternoon. Wet, miserable, gusty night, with much rain and wind at intervals.

Continuous steady rain, fine to heavy, till 10.30 a.m.; then cloudy, very windy, dull, chilly, with occasional drizzle. Continuous rain and gusty wind all night.

Cold, gusty wind, continuous drizzle almost all day. Very stormy, windy night, much rain.

Cloudy, occasional sunshine and showers. Fine moonlight. Few fleecy clouds.

Cool, cloudy day; sun occasionally, especially after noon. No rain. 5.30 p.m. entirely overcast. Moonlight, with cirrus and much mist.

Dull early. Hazy sunshine. Sultry morning, clouds, some sun. Hot afternoon, a few cumulus, strato-cumulus on horizon. 5 p.m. thundery, heavy clouds. 8 p.m. terrific thunderstorm, deluge, slight hurricane.

Steamy, close morning. 2.30 p.m. heavy thunderstorm.

6 a.m. bright sun. Steamy mist. 7.30 to 8 heavy rain. Very hot till midday. 2.15 to 4 severe thunderstorm. 5.30 p.m. fine, mists on mountains. Fine moonlight, chilly, cloudless, misty evening.

6 a.m. dense mist. By 7.30 cloudless. Grilling, with north breezes. 2.30 p.m. heavy showers all afternoon, slight sunshine. 9 p.m. cloudy, lightning, no breeze.

Cloudy, close. Hot sultry morning. Windy on hills. 9 p.m. distant thunder and lightning. Thunderstorms with much rain all night.

Date.	Fahrenheit.		Barometer.	REMARKS.
	Min. Thermometer.	Max. Thermometer.		
Dec. 16	7.30 a.m. 65° 9 p.m. 68°	106°	Inches. 7.30 a.m. 26.70 12 a.m. 26.65 1.30 p.m. 26.60 3.30 p.m. 26.50 6 p.m. 26.60 9.30 p.m. 26.65 6 a.m. 26.65 10 p.m. 26.65 7 a.m. 26.70 5 p.m. 26.65	Poured all morning. Cleared by noon. Fine afternoon, slight sunshine, strong, warm north wind. 3.30 p.m. 80° in rancho, thundery. 4.30-6 severe thunderstorm, with strong gusty wind. Rained from 9 p.m.
" 17	6.30 a.m. 66° 10 p.m. 66°	116°	6 a.m. 26.65 10 p.m. 26.65	Dull morning, cloudy, thundery, no wind, little sunshine. Drizzle and heavy rain all afternoon and evening.
" 18	6.30 a.m. 66° 5 p.m. 73° 8 p.m. 72°	...	7 a.m. 26.70 5 p.m. 26.65	Cool, cloudy morning, strong wind. Sunny, sultry afternoon. 8 p.m. heavy drizzle. 8.30 continuous downpour began.
" 19	6 a.m. 61° 5 p.m. 69°	114°	6 a.m. 26.70 5 p.m. 26.60 9 p.m. 26.65	Dull early. Drizzle 7-7.30 a.m.; then fine, some sunshine till 1 p.m. Rain at intervals all afternoon.* Evening, lightning all round.
" 20	6.30 a.m. 66°	...	6.30 a.m. 26.70 8 p.m. 26.80	Shifted camp to <i>Camapubo village</i> . Heavy showers, north wind; then fine rain. Afternoon no rain. Heavy rain during night.
" 21	7 a.m. 70°	100°	7 a.m. 26.85 9 p.m. 26.80	Very wet early. Sultry morning. No wind or rain. Deluge 12.30 to 3.30 p.m.; then showers. Heavy thunderstorm 6.30 p.m.
" 22	6 a.m. 67°	106°	6 a.m. 26.75	6 a.m. dense mist. Sun at intervals.
" 23	7 a.m. 70°	118°	7 a.m. 26.80	Grand morning. Cirrus and cumulus. Rain midday. Thunder all afternoon. No rain.
" 24	4.30 p.m. 80° 6.30 a.m. 69° 6.30 p.m. 66°	116°	4.30 p.m. 26.70 6.30 a.m. 26.70 6.30 p.m. 26.65 9.30 p.m. 26.70	Dull early. Clouds on horizon. Bright, hot morning. Occasional clouds and showers around us. Midday very heavy thunderstorm. Bright, yellow sunset. Starlight night.
" 25	7 a.m. 73°	105°	7 a.m. 26.70 9 p.m. 26.70	Fine early. Slight mists. Heavy showers and rain all afternoon. Starlight night.
" 26	6 a.m. 71° 5 p.m. 84° 7.30 p.m. 72°	109°	6 a.m. 26.73 5 p.m. 26.65 9 p.m. 26.70	Fine morning; then dull, thundery, glimpses of hot sunshine. Very heavy thunderstorm 7.30 p.m. At 9 p.m. much rain, lightning all round.

* As usual, rain first from south, then north.

Dec. 27	6 a.m. 65° 6 p.m. 76° 9 p.m. 73°	116°	6 a.m. 26.70 6 p.m. 26.65 9.30 p.m. 26.75	Very fine early. Scattered belts of mists on hills. Cloudless and grilling till noon, then shower. Thunder all round during afternoon. Very gusty evening, much thunder and lightning. 9.30 p.m. heavy storm.
" 28	6 a.m. 67° 5 p.m. 76° 9.30 p.m. 70°	109°	6 a.m. 26.70 5 p.m. 26.61 9.30 p.m. 26.70	Cloudy early. Splendid sunshine, mackerel sky, cumulus on horizon. Slight rain, midday. Afternoon fresh breezes. 5 p.m. shower, with thunder. 7.30-9.30 p.m. heavy storm, rain, wind, thunder.
" 29	6.30 a.m. 68° 3 p.m. 78° 5 p.m. 73° 9.30 p.m. 70°	112°	6.30 a.m. 26.70 3 p.m. 26.60 5 p.m. 26.60 9.30 p.m. 26.70	Light clouds. Cool, cloudy, breezy morning. Midday 77° in rancho. Showers around, a few drops with us. 5 p.m. heavy thunder, showers with wind. 7.30-9.30 p.m. steady downpour.
" 30	7 a.m. 26.70 1.30 p.m. 103° 9 p.m. 73°	105°	7 a.m. 26.70 1.30 p.m. 26.65 9 p.m. 26.70	Very fine, rather cloudy, breezy morning. Midday slight shower, heavy rain all round, 78° in rancho. Cool north wind.
" 31	6.15 a.m. 68° 5.15 p.m. 72° 11.30 p.m. 68°	108°	6.15 a.m. 26.70 5.15 p.m. 26.65 11.30 p.m. 26.75	Grand afternoon, mild north breezes, sunshine, a few clouds. Overcast early, much steamy mist on hills. Very hot, steamy, sultry morning. 1.30 p.m. thunder. 2 p.m. heavy showers, then cloudy. 6 p.m. rain began, which continued almost incessantly all night.
1884 Jan. 1	8 a.m. 75° 5.30 p.m. 68°	88°	8 a.m. 26.70 3.30 p.m. 26.675 5.30 p.m. 26.65 9.30 p.m. 26.73 6.15 a.m. 26.75 6 p.m. 26.75	Rain early. 11.30 a.m. very heavy rain. 4 p.m. drizzle, which continued all evening and night.
" 2	6.15 a.m. 68° 12 a.m. 64° 6 p.m. 66°	75°	6.15 a.m. 26.75 6 p.m. 26.75 9.30 p.m. 26.80	Still raining. Poured continuously all day, with deluges at intervals.
" 3	8 a.m. 65° 2 p.m. 66° 7 p.m. 65° 9 p.m. 65°	70°	8 a.m. 26.80 2 p.m. 26.80 6 p.m. 26.80 9 p.m. 26.80	Poured all night. Steady, heavy rain all morning. Afternoon fine rain, with heavy showers, which continued all evening.
" 4	6.30 a.m. 63° 12 a.m. 71° 4.15 p.m. 65° 6.30 p.m. 63°	71°	6.30 a.m. 26.76 12 a.m. 26.80 4.15 p.m. 26.75 6.30 p.m. 26.75 9.30 p.m. 26.80 6.30 a.m. 26.78 5.30 p.m. 26.75 9.30 p.m. 26.75	Not much rain during night. 7-9.30 a.m. showers; then steady rain. Fresh north-east breeze at 1.30 p.m. Heavy rain all afternoon and evening, especially at 9.30 p.m.
" 5	6.30 a.m. 67° 5.30 p.m. 65° 9.30 p.m. 64°	75°	6.30 a.m. 26.78 5.30 p.m. 26.75 9.30 p.m. 26.75	Detached clouds at 6.30 a.m., but no blue sky. 7 to 10 a.m. showers; then rain, almost ceaselessly, all day and night.*

* Note from Rio de Janeiro, January 5: "It has been raining incessantly since the 1st inst."—*Rio News*.

Date.	Fahrenheit.		Barometer.	REMARKS.
	Min. Thermometer.	Max. Thermometer.		
Jan. 6	7 a.m. 65° 3.30 p.m. 76° 6 p.m. 66°	95°	Inches. 7 a.m. 26.80 3.30 p.m. 26.70 6 p.m. 26.725 8 p.m. 26.75	7 a.m. steady downpour. Showers at intervals throughout the day, with occasional warm sunshine. Light, mild, north breezes. 5-5.45 p.m. tremendous rain. 8 p.m. fulfil moonlight through cirrus, or cumulus, or nimbus. Mists over valleys. Lightning to north.
" 7	6 a.m. 67° 5 p.m. 68° 9.15 p.m. 67°	114°	6 a.m. 26.75 5 p.m. 26.65 9.15 p.m. 26.75	Heavy showers during night. 6 a.m. raining, with much smoky mist. Dull till 11 a.m. Very hot 11-12; then a deluge. Heavy thunder and rain at intervals all afternoon, and rain during the evening. 9 p.m. moon much concealed by nimbus. 9.15 heavy shower.
" 8	6 a.m. 68° 6 p.m. 70° 8 p.m. 65° 10 p.m. 64°	115°	6 a.m. 26.715 6 p.m. 26.675 10 p.m. 26.75	Heavy showers during night. 6 a.m. fine, sunshine, blue sky, heavy mists over forests. Throughout the day cumulus clouds, with bursts of hot sunshine. Fine, orange sunset; the first for a long time. No rain to-day. 8 p.m. misty, moon with slight halo. Faint south-west breezes. Reflected lightning to north-west. 10 p.m. gusty.
" 9	6.30 a.m. 61° 6.30 p.m. 66° 10 p.m. 64° 6.30 a.m. 64° 6.30 p.m. 67°	86°	6.30 a.m. 26.75 6.30 p.m. 26.75 10 p.m. 26.80 6.30 a.m. 26.80 6.30 p.m. 26.80 9.30 p.m. 26.80	Entirely overcast. Cool, breezy, a few drops of rain occasionally. Moonlight night, hazy and cloudy.
" 10	6 a.m. 65° 6 p.m. 65°	100°	6.30 a.m. 26.75 6.30 p.m. 26.75 10 p.m. 26.80	6.30 a.m. entirely overcast. Several drizzly showers, with fulfil sunshine during the day. 9.30-10.30 p.m. rain.
" 11	6.30 a.m. 70° 6.30 p.m. 65° 9 p.m. 63°	105°	6 a.m. 26.80 6 p.m. 26.775 10 p.m. 26.80 6.30 a.m. 26.80 6.30 p.m. 26.775 9.30 p.m. 26.825	6 a.m. overcast, slight mists. 11-12.30 heavy showers. 1.30-4 p.m. heavy rain.
" 12	7 a.m. 80° 3 p.m. 68°	86°	7 a.m. 26.80 3 p.m. 26.79	6.30 a.m. very fine, blue sky, dense mists. Morning, almost cloudless sunshine, fresh breezes. 12.30 shower. Afternoon, cloudy, sultry. 3.15 p.m. heavy shower. 4.15 very heavy storm, wind, rain, thunder. Rain at intervals till evening. 9.30 p.m. fine, moonlight, cirrus, mists over forests, lighting incessant to east.
" 13				7 a.m. fine, sunny, a few clouds. Cloudy, sultry morning; heavy, continuous, distant thunder. 1.30 p.m. showers.

Jan. 13	6 p.m. 63°		6 p.m. 26°80	2.30-3 p.m. Rain, dull, cloudy.
" 14	6.15 a.m. 63°	100°	9 p.m. 26°83	6.15 a.m. dull. Occasional sunshine during morning. Sultry, steamy. Afternoon, overcast, cool, no breezes, even on hills.
" 15	5 p.m. 70°		5 p.m. 26°825	Dull evening. No rain to-day.
" 16	6.30 a.m. 64°	86°	9 p.m. 26°90	6.30 a.m. entirely overcast. Dull, cool morning. Drizzle 11-11.30 a.m. Slight sunshine, afternoon. No rain.
" 17*	6 p.m. 66°		6 p.m. 26°90	Breezy morning, cloudy, very little sunshine. Distant thunder all afternoon. Showers at 3 and 5.30 p.m.
" 18	9 p.m. 62°	104°	9 p.m. 26°90	Removed into <i>Brumado</i> . 6 a.m. cloudy, much steamy mist. 3 p.m. thunderstorm. Starlight night.
	6.45 a.m. 70°		6.45 a.m. 26°90	NOTE.—The maximum thermometer readings appear low compared with the great heat experienced lately. The thermometer, exposed to the sunshine, was always placed on the ground, and I presume that the moisture evaporated by the sun after heavy rains has affected the registered temperature.
	5 p.m. 68°		3 p.m. 26°82	The barometer, a small aneroid of Negretti, has always been on an iron trunk in my tent, raised from the ground on logs to avoid the damp.
			8 p.m. 26°85	Barometrical readings have been rather higher lately. I wish, however, to draw attention to the fact of the small variation which occurs. Rain, wind, etc., seem not to affect it. It will be observed that, whatever the weather may be, there is an almost invariable fall shortly after midday; at 3 or 4 p.m. the maximum depression is reached, when the barometer again rises, and at 8 or 9 p.m. the readings are about the same as at 6 or 7 the following morning.
			6 a.m. 26°85	There is, apparently, hardly any variation of pressure during the night. From this date to the middle of March I had no thermometer at my house in <i>Brumado</i> . I then obtained the loan of a minimum thermometer, but could not leave it exposed in the day for fear of its being stolen, which occurred occasionally, but I regained possession.
			10.30 p.m. 26°80	6.30 a.m. dense mist. Magnificent, cloudless, till 2 p.m.; then cloudy, showery, thunder and lightning to west.

* My last remaining thermometer was broken.

Date.	Fahrenheit.		Barometer.	REMARKS.
	Min. Thermometer.	Max. Thermometer.		
Jan. 19	0.15 a.m. 65°	116°	Inches. 0.15 a.m. 26.75 6 a.m. 26.80 12 a.m. 26.80 2 p.m. 26.75 12 p.m. 26.80 6 a.m. 26.80 11 p.m. 26.80 7 a.m. 26.80	Midnight, fine, cloudless, starlight. 6 a.m. dense mist. Magnificent morning. Noon, heavy thunder, sultry afternoon, much nimbus. Severe storm 3.30 to 5.30 p.m.
" 20	...	...		7 a.m. dense mist. Severe thunderstorm 3-5.30 p.m.
" 21	...	...		7 a.m. dense mist. Very fine day. 5 p.m. heavy storm, rained all evening.
" 22	7 a.m. 66°	...	7 a.m. 26.85	Very fine all day. 4 p.m. great storm, thunder and deluge all evening.
" 23	7 a.m. 65° 10 p.m. 65°	...	7 a.m. 26.875 10 p.m. 26.90	Dull morning. Sultry, cloudy day. Heavy thunder, slight rain, much nimbus all afternoon. Dull evening, no rain. Starlight night.
" 24	6.30 a.m. 64°	...	6.30 a.m. 26.85 10.30 p.m. 26.80	6.30 a.m. cloudless, slight mist over mountains. Magnificent day, cumulus, distant thunder after noon. Very hot. Grand sunset. Starlight night. Lightning to west. <i>First saw the comet.</i>
" 25	...	...	7 a.m. 26.83	7 a.m. dense mist. Magnificent, almost cloudless day. Very hot. Maximum 78° in house. Grand sunset. Starlight night. <i>Comet very plain.</i>
" 26	...	120° noon	6.30 a.m. 26.85 12 a.m. 26.80 6 p.m. 26.75 11 p.m. 26.80 8 a.m. 26.80 10 p.m. 26.90	Slight mist early. Cloudless day. Atmosphere very clear. Grilling. Splendid night.
" 27	8 a.m. 64°	...	6.30 a.m. 26.80	Cloudless day.
" 28	...	...	12 a.m. 26.75 5 p.m. 26.70 9 p.m. 26.75 7 a.m. 26.75	Slight mist early. Almost cloudless day. After 4 p.m. cloudy, very sultry. Continuous lightning to south-west. No rain evening or during night.
" 29	...	...		Fine early, no dew or mist. Very fine all day. Cloudy after-

" 31	...	...	rain at 2 p.m. Magnificent day. Sultry afternoon. 5.30 p.m. heavy thunder. Storms of rain all round. A few drops here. Dull morning. Very sultry day. Much nimbus, occasional sunshine. Slight showers at sunset.
Feb. 1	...	...	Dull morning. 2 p.m. rain. Fine rain at intervals all after- noon. Cloudless day. Noon 80° in house. Grand sunset. Starlight night.
" 2	...	...	Dense mist early. Grilling day. Strato-cumulus. Cloudless moonlight.
" 3	...	...	No mist early. Cloudy by 8 a.m. Afternoon, slight rain. Fine moonlight, a few cirrus clouds.
" 4	120° noon	...	Dull early. Very fine day. Occasional clouds. No rain. Grand sunset. Cloudless moonlight.
" 5	...	...	Cloudless morning. Dense mist in valleys. Grand day. Slight strato-cumulus. Fine starlight.
" 6	...	...	Dull early. By 7.30 a.m. cloudless. Very hot day. From 4 p.m. much nimbus, thunder and lightning throughout the evening. Sharp shower 4.30 p.m. Fine at 11.30 p.m.
" 7	122° noon	...	Dull early. Clear, very hot by 9 a.m. 11 a.m. continuous distant thunder. 12.30 most tremendous thunder-clap, with sun shining and no rain, dense blackness one mile to north. 2 p.m. very severe thunderstorm. Rained throughout after- noon and evening. Dull night, rain ceased.
" 8	110° noon	...	Very cool, dull, entirely overcast. Showery, cold day.
" 9	120° noon	...	From 7.30 drizzle all morning. Poured more or less heavily all afternoon and evening. Rain ceased at 9.30 p.m.
" 10	8 a.m. 60° 12 a.m. 60°	66°	Fine early. Splendid day. Sharp, short, heavy shower at noon. Very heavy rain afternoon and evening.
" 11	6.30 a.m. 58°	...	
" 12	...	...

Date.	Fahrenheit.		Barometer.	REMARKS.
	Min. Thermometer.	Max. Thermometer.		
Feb. 13	Inches. '6 a.m. 26°70 6 p.m. 26°65 7 a.m. 26°675 10.30 a.m. 26°675 10 p.m. 26°70 6.30 a.m. 26°70 12 a.m. 26°60 6 p.m. 26°65 9.15 p.m. 26°70 7.30 a.m. 26°70 6 p.m. 26°65 7 a.m. 26°70 7 a.m. 26°65 6 p.m. 26°575 9 p.m. 26°65 6 a.m. 26°65 12 a.m. 26°675 9 p.m. 26°675 6.30 a.m. 26°70 12 a.m. 26°71 9.30 p.m. 26°70 6 a.m. 26°71 11 p.m. 26°70 6 a.m. 26°70	6 a.m. fine. 6.30 a.m. rain. Heavy showers, driving rain, much wind at intervals. Otherwise fine day. Fine night. 7 a.m. drizzle. Gradually cleared off. Magnificent afternoon. Fine sunset. Very oppressive evening, slight thunder. Starlight. Dull. Slight shower at noon. Grand afternoon. Very heavy showers at night. Heavy rain early. Fine morning. Very showery afternoon. Very wet early. Fine day, with frequent heavy showers. Rain early. Very hot day. Afternoon, heavy showers till after 5 p.m. Dull evening. Very heavy torrents during the night and early morning. Fine till 10 a.m. Very showery day, hardly any sunshine, but balmy and warm. Very heavy rain all evening. Dense mist till 11 a.m. Noon 68° in the house. 9 p.m. 65°, very oppressive. Dense mist early. 10 a.m. very fine. Afternoon and evening constant rain, with thunder. <i>One terrific thunder-clap.</i> Heavy rain early. Drizzle to heavy rain till 11 a.m.; then showery till 1 p.m. Magnificent afternoon. Evening sultry, very oppressive. Very fine early. Oppressive, thundery, hot sunshine till 1.30 p.m. Heavy and slight showers all afternoon. A little thunder; <i>one terrific clap.</i> Very fine sunset. Lightning to east and west at 7.30 p.m. Starlight. Heavy belts of mist in valleys early. Cloudless day. Very hot. Heavy thunderstorm 5 p.m. Thunder throughout
" 14		
" 15		
" 16		
" 17		
" 18		
" 19		
" 20		
" 21	...	107° 11.30 a.m.		
" 22		
" 23		
" 24		

Feb. 25	...	...	6 a.m. 26.70 5 p.m. 26.70 10 p.m. 26.70	...	Fine early; then clouds, misty showers till 1.30 p.m.; then very hot. Afternoon, thunder, with showers and cool breezes. Severe shower 5 p.m. More or less rain all evening.
" 26	...	...	6 a.m. 26.70 6 p.m. 26.65 9 p.m. 26.70 6 a.m. 26.65 10 p.m. 26.725	...	Cloudless early. Ground mist. 8.30 a.m. heavy shower. Till noon fine, grilling. Very showery and oppressive all afternoon. Rain nearly all evening.
" 27	...	...	6 a.m. 26.65 10 p.m. 26.725	...	Heavy rain early. Cool, cloudy, showers from north at intervals all day. Thunder from 3.30 p.m. 9.30 p.m. strong wind and drizzle. 10 p.m. heavy rain, with high wind.
" 28	...	57° noon	6 a.m. 26.725 11.30 a.m. 26.80 11 p.m. 26.675 6 a.m. 26.775 12 a.m. 26.80 9 p.m. 26.80 6 a.m. 26.80 6 p.m. 26.70 6 a.m. 26.75 6 p.m. 26.75	...	Cool, dull, grey morning. 7.30-11 a.m. drizzle. Very chilly all day, cold breeze, misty sunshine at midday.
" 29	...	...	6 a.m. 26.75 12 a.m. 26.80 9 p.m. 26.80 6 a.m. 26.80 6 p.m. 26.70 6 a.m. 26.75 6 p.m. 26.75	...	Dull, cold, early. Magnificent hot day. No rain. Starlight night.
Mar. 1	6 a.m. 52°	...	6 a.m. 26.75 12 a.m. 26.80 9 p.m. 26.80 6 a.m. 26.80 6 p.m. 26.70 6 a.m. 26.75 6 p.m. 26.75	...	Cloudless day. Starlight night.
" 2	6 a.m. 52°	...	6 a.m. 26.75 6 p.m. 26.75	...	Ditto
" 3	5.45 a.m. 56°	...	5.45 a.m. 26.80 6.15 a.m. 26.75 10.30 p.m. 26.70 6 a.m. 26.725 8 p.m. 26.70	...	Dense mist early. Cloudless day.
" 4	6.15 a.m. 54°	...	6 a.m. 26.75 6 p.m. 26.75	...	Another grilling day. Scattered cirrus and strato-cumulus. Very fine evening. Lightning to south-west.
" 5	...	...	6 a.m. 26.75 6 p.m. 26.75	...	Steady, fine rain till 8 a.m. Sultry morning. Few drops of rain at 2.30 p.m. Grand afternoon and evening. 7.30 p.m. very heavy rain, with lightning; then severe thunderstorm, <i>one terrific clap</i> .
" 6	...	...	6 a.m. 26.70 6 p.m. 26.65 6 a.m. 26.75 6 p.m. 26.70 10 p.m. 26.75 6 a.m. 26.75 10.30 p.m. 26.75 7 a.m. 26.75 10 p.m. 26.765 6.30 a.m. 26.765	...	Overcast, cool, early. Fine at midday. 1.30 p.m. rain. Very fine afternoon. Cloudless night.
" 7	...	...	6 a.m. 26.75 6 p.m. 26.70 10 p.m. 26.75 6 a.m. 26.75 10.30 p.m. 26.75 7 a.m. 26.75 10 p.m. 26.765 6.30 a.m. 26.765	...	Overcast all day, very cold. Heavy rain to north-west all afternoon, but none with us till 6 p.m.; then drizzle all evening.
" 8	...	63° noon	6 a.m. 26.75 6 p.m. 26.75 10 p.m. 26.75 6 a.m. 26.75 10.30 p.m. 26.75 7 a.m. 26.75 10 p.m. 26.765 6.30 a.m. 26.765	...	Drizzle, cool, early. Steady downpour all day.
" 9	...	...	6 a.m. 26.75 6 p.m. 26.75 10 p.m. 26.765 6.30 a.m. 26.765	...	Continuous rain, drizzle to heavy, all day and night.
" 10	...	...	6 a.m. 26.75 6 p.m. 26.75 10 p.m. 26.765 6.30 a.m. 26.765	...	Cloudy, with dense mist early. Fine by midday. Hot afternoon, with sunshine. Heavy thunder after sunset. No rain.

Date.	Fahrenheit.		Barometer.	REMARKS.
	Min. Thermometer.	Max. Thermometer.		
Mar. 11	...	...	Inches. 7 a.m. 26.80 10 p.m. 26.80	Dense mist, cleared off by 9.45 a.m. Magnificent till noon. Thunder, heavy rain, and wind continued at intervals all afternoon. Dull evening.
" 12	...	...	7 a.m. 26.80	Dense mist early. Heavy cumulo-nimbus till noon; then cirrus overhead, cumulus on horizon. Very hot. 1.30 p.m. much wind, sharp shower. Showery afternoon. Grand, stormy sunset. Orange afterglow.
" 13	...	...	0.30 a.m. 26.80 8 a.m. 26.80 11 p.m. 26.80	Torrents of rain, very cold, fresh breeze early. Showery and sunless all day. 2.30 p.m. strong, gusty wind. 11 p.m. dense mist. Very cold.
" 14	...	...	7 a.m. 26.825 11 p.m. 26.81	Dull, cool, early. By 10.30 hot, sunshine. Afternoon, cloudy, balmy breeze. Very fine scarlet afterglow. 11 p.m. dense mist.
" 15	...	...	7 a.m. 26.81	Dense mist till 9 a.m. By noon almost cloudless. Fine afternoon.
" 16	...	...	7 a.m. 26.825	Mist early. Cool, rather cloudy day. Fine sunset. Cloudless night.
" 17	10.45 a.m. 71°	...	6 a.m. 26.775	Dense mist at 6 a.m. Began to clear 7.30. By 10 cloudless, pleasant breeze. Grand sunset and afterglow. Fine night.
" 18	...	...	6.30 a.m. 26.775 10 p.m. 26.775	Mist early, entirely overcast. By 9 a.m. cloudless, with breeze. Noon, a few cumulus clouds. 4 p.m. thunder and heavy rain to north-west. 8 p.m. heavy rain. Very heavy thunder all evening, but only a few drops of rain.
" 19	6 a.m. 66° 10 p.m. 68°	95° 11 a.m.	6 a.m. 26.675	Slight mist early. Cloudless day. Evening, much lightning to south-west and south-east.
" 20	6.30 a.m. 61°	...	6.30 a.m. 26.875	Entirely overcast. Dense mist, increasing till 8 a.m. By 8.30 cloudless. Grand day, cloudless sunset. Lightning to east. Overcast. Cool, strong breezes. Very clear atmosphere. But little sunshine. Cloudless sunset.
" 21	...	...	6.30 a.m. 26.90 10 p.m. 26.875	Overcast. Mist in valleys. By 8.30 a.m. almost cloudless. Grilling sunshine, strong breeze. Very fine sunset. Cloudless night.
" 22	...	...	6 a.m. 26.775	

" 24	6 a.m. 53°	...	9.30 a.m. 26.85 6 a.m. 26.875 11 p.m. 26.85 6 a.m. 26.85 10 p.m. 26.825 7 a.m. 26.825 10 p.m. 26.80	Dense mist till 8.30. 11 a.m. 73° indoors. Rather cloudy, with breezes. Fine sunset. Starlight. Dull and cold, clouds low early. Grand day. Fine afterglow.
" 25	6 a.m. 56°	100° 11 a.m.	...	Entirely overcast, cool, breezy morning. After 11 fine, a few strato-cumulus. 12-2 strong gusty breezes. Very fine sunset, with afterglow.
" 26	...	...	6 a.m. 26.80 12 a.m. 26.80 10 p.m. 26.80 6.30 a.m. 26.80 12 a.m. 26.80 7 a.m. 26.775 8.30 p.m. 26.75 7 a.m. 26.80 3 p.m. 26.725 9 p.m. 26.80 6.30 a.m. 26.80 10 p.m. 26.80 7 a.m. 26.80 12 a.m. 26.75 5.30 p.m. 26.75 6.30 a.m. 26.80	Windy, cold, drizzle till 10 a.m. 2 p.m. slight shower; then cold and blustery, very little sunshine. 3.30 sharp shower from west. Showers during the evening and night. Windy, cold, cloudy. Noon, sunshine, gusty. Stormy, but fine sunset. Cloudless till 1 p.m. Cloudy afternoon.
" 27	6 a.m. 55°	...	...	Very fine all day, but many clouds. Cloudless night, lightning to south-west.
" 28	6.30 a.m. 60°	96° noon	...	Cloudless, with dense ground-mist early. Very hot day. Evening fine, lightning to south-west. Fine afterglow.
" 29	7 a.m. 63°	...	...	Dense mist early. Cloudless day, very hot. Afternoon, very strong gusty wind. Storms and thunder to north. A few drops of rain. Cloudy from 5 p.m.
" 30	7 a.m. 63°	...	...	Cloudy early. Cloudless by 10 a.m. Afternoon rather cloudy. Fine night.
" 31	6.30 a.m. 58°	...	110° 11 a.m.	Dull; dense mist in valleys. By 10 a.m. almost cloudless. Showery, breezy afternoon. Dull evening.
April 1	...	96° 10.30 a.m.	...	Deluges during the night. Mist early. Fine morning. Dull, cool afternoon, with showers. Grand sunset, with afterglow. Fine night.
" 2	54°	...	6.30 a.m. 26.80	Cloudless sunrise, fine all day.
" 3	50°	...	6.30 a.m. 26.725 12 a.m. 26.725 10 p.m. 26.75 6 a.m. 26.725	Cloudless day. Fine afterglow.
" 4	56°	85° noon	...	Cloudless day. Fine afterglow.
" 5	50°	...	7 a.m. 26.80 3 p.m. 26.70 9 p.m. 26.775 7 a.m. 26.80 12 a.m. 26.75 9 p.m. 26.75	Dense mist at 7 a.m. Quite clear by 9 a.m. Cloudless day and night.
" 6	6.30 a.m. 53° 44°	...	...
" 7	46°	...	...
" 7	7 a.m. 55°	...	...

Date.	Fahrenheit.		Barometer.	REMARKS.
	Min. Thermometer.	Max. Thermometer.		
April 8	46°	...	Inches. 6 a.m. 26.75	Entirely overcast, dense mist in valleys. Cool, cloudy day.
" 9	7 a.m. 56°	66° noon	6.30 a.m. 26.75	Noon, slight rain. 5.30-6.30 p.m. heavy thunderstorm.
" 10	6.30 a.m. 60°	...	10 p.m. 26.775	Fine rain till midday. Cloudy afternoon. Fine sunset.
" 11	54°	...	6.30 a.m. 26.775	Dense mist early. Very fine day from 10 a.m. Grand sunset
" 12	6.30 a.m. 61°	...	10 p.m. 26.825	and afterglow. Lightning to south-east.
" 13	53°	...	6.30 a.m. 26.875	Dull morning. Magnificent afternoon and evening.
" 14	6.30 a.m. 63°	73° 11 a.m.	7 a.m. 26.90	Very blustering and cold, dull and misty.
" 15	7 a.m. 61°	...	11 a.m. 26.95	Cloudless day from 11 a.m. Fine sunset. Lightning to south.
" 16	46°	...	9 a.m. 26.90	Cloudless till noon. Afternoon, cool, overcast. Evening,
" 17	53°	...	6.30 a.m. 26.875	lightning to south-west, much nimbus.
" 18	6.30 a.m. 56°	...	10 p.m. 26.825	Steady, fine rain till 1 p.m. Dull afternoon and evening.
" 19	53°	...	7 a.m. 26.825	Dull early. Magnificent by 11 a.m. Much rain all round by
" 20	7 a.m. 56°	98° 11 a.m.	12 a.m. 26.80	1 p.m. Heavy showers from 5 p.m., lightning and distant
" 21	7 a.m. 56°	...	7 a.m. 26.825	thunder.
" 22	50°	96° 11 a.m.	11 a.m. 26.78	Dense mist early. Very fine by 11 a.m., which continued
" 23	50°	...	7 a.m. 26.83	all day.
" 24	7 a.m. 56°	86° 11 a.m.	11 a.m. 26.80	Cloudless all day, strong but balmy breeze.
" 25	44°	...	7 a.m. 26.84	Dull and chilly, much mist early. Cloudless day. Cool south
" 26	7 a.m. 48°	86° 11 a.m.	7 a.m. 26.80	breezes.
" 27	7 a.m. 51°	...	11 a.m. 26.73	Dense mist early. Cloudless day. Fine afterglow.
" 28	43°	85° 3 p.m. (shade)	8 a.m. 26.86	Dense mist early, increased till 8.30 a.m. Cloudless and very
" 29	8 a.m. 55°	95° noon (shade)	7 a.m. 26.83	clear by 9.30, which continued all day, with soft breezes.
" 30	48°	...	7 a.m. 26.83	Afterglow.
" 31	7 a.m. 50°	...	7 a.m. 26.83	Dense mist early. Cloudless by 10.30 a.m. Afternoon, a
" 32	45°	...	7 a.m. 26.83	few clouds, slight breeze. Fine afterglow, rays of crimson

April 23	43° 7 a.m. 56°	...	7 a.m. 26°90	Misty early. Cloudless by 10 a.m. Few clouds after noon. Fine afterglow, splendid crimson rays.
" 24	47° 7 a.m. 57°	86° 11 a.m.	7 a.m. 26°85 11 a.m. 26°80 10 p.m. 26°80 7 a.m. 26°82 6 p.m. 26°70	Thick mist till 10; then cloudless, with soft breezes till sunset. Magnificent afterglow. Heavy clouds at sunset, lightning to south-east.
" 25	47° 7 a.m. 55°	85° 11 a.m.	8 a.m. 26°80	Thick mist early. Fine, but cool, cloudy day. Cloudless evening.
" 26	46° 7 a.m. 56°	95° 11 a.m.	8 a.m. 26°80	Entirely overcast. Heavy nimbus, cool breezes all day. Fine afterglow, with eight broad rays of light.
" 27	45° 8 a.m. 60°	...	7 a.m. 26°88 11 p.m. 26°80 7 a.m. 26°85	Cloudless all day. Faint afterglow.
" 28	42° 7 a.m. 47°	82° 11 a.m.	7 a.m. 26°88 11 p.m. 26°80 7 a.m. 26°85	Cloudless early. From 11 a.m. more or less cloudy. Cool breezes all day. Fine cloudless sunset.
" 29	44° 7 a.m. 54° 5 p.m. 60°	90° noon	7 a.m. 26°85	Heavy mist in valleys, cloudless, 6 a.m. Midday, hot sunshine, gusty, cool wind.
" 30	41° 7 a.m. 48°	88° 11 a.m.	7 a.m. 26°85 11 a.m. 26°80 8.30 p.m. 26°80 7 a.m. 26°85	Thick mist till 9 a.m.; then cloudless till noon. Cool, cloudy afternoon. Cloudless by 8.30 p.m.
May 1	41° 7 a.m. 53°	96° 11 a.m.	7 a.m. 26°85	Dense mist. Began to clear rapidly at 10. Quite cloudless by 10.30 a.m. Light breezes. Fine afterglow, diffused.
" 2	45° 7 a.m. 55°	85° 11.30 a.m.	7 a.m. 26°875	Entirely overcast. Clouds very low. A little sunshine. Breezy afternoon. 5 p.m. very heavy thunder-clouds all round. Much rain to south-west. Stormy sunset. Cloudless at 9 p.m. Entirely overcast by 11. No rain here.
" 3	53° 7 a.m. 60°	...	7 a.m. 26°90	Entirely overcast, with breezy clouds all day. Cloudless at 10 p.m.
" 4	41° 8 a.m. 55°	...	8 a.m. 26°88 10 p.m. 26°80 7 a.m. 26°80	Dense mist early. Almost cloudless day and evening.
" 5	40°	86° 11 a.m.	6 a.m. 26°80 9 p.m. 26°93 7 a.m. 26°85 noon 26°73 6.30 a.m. 26°80	7 a.m. dense mist, very chilly, penetrating damp. 10.30 a.m. mist gone, cloudy. From 11 a.m. quite cloudless, cool breezes.
" 6	44° 6 a.m. 55°	...	6.30 a.m. 26°80	Dense mist early. Cloudless day and night.
" 7	39° 7 a.m. 48°	88° noon	6.30 a.m. 26°90	Cloudless all day.
" 8	45° 6.30 a.m. 50°	...	6.30 a.m. 26°90	Dull, sultry, cloudy. Sunny 11-2; then cloudy. 5-6 slight shower.
" 9	45° 6.30 a.m. 50°	...	6.30 a.m. 26°90	Entirely overcast all day. Strong breezes. Cold evening.

Date.	Fahrenheit.		Barometer.	REMARKS.
	Min. Thermometer.	Max. Thermometer.		
May 10	45°	...	Inches. 7 a.m. 26.80	3 a.m. cloudless, brilliant moonlight. Entirely overcast all day, with few glimpses of sunshine till 5.30 p.m.; then cloudless. Mist early. Cloudless day. Afternoon, a few cumulus clouds.
" 11*	...	...	8 a.m. 26.90	6 a.m. dense mist, raw, damp, very cold. From 9.30 a.m. cloudless day, strong breeze. 9 p.m. cloudless moonlight.
" 12	...	...	6 a.m. 26.80	Entirely overcast early. From 9 a.m. very fine, occasional clouds.
" 13	49°	...	9 p.m. 26.80	Entirely overcast early. Fine day, but cool, with occasional hot sunshine. Very dark night, heavy nimbus.
" 14	6.30 a.m. 53°	...	7 a.m. 26.85	Heavy clouds all morning. Cool day. Afternoon, a little sunshine. 11.30 p.m. very cold and raw, dense fog.
" 15	49°	...	6.30 a.m. 26.85	Entirely overcast till 10. Very fine, hot day. Cold evening.
" 16	50°	...	7 a.m. 26.85	Dense mist early. Very fine, hot day. Very dark night, much nimbus.
" 17	53°	...	10 p.m. 26.80	Entirely overcast. Mild. Heavy rain at 2 and 7 p.m.
" 18	47°	...	7 a.m. 26.80	Lightning to west at 10 p.m. Heavy rain at intervals all night.
" 19	55°	...	8 a.m. 26.80	Heavy fine rain all morning. Afternoon dull, gleams of sunshine. Clear sunset. 10 p.m. cloudy, lightning all round.
" 20	45°	...	3.30 p.m. 26.70	Heavy nimbus, dull and cold all day. Cloudy night, very cold.
" 21	7 a.m. 55°	...	9 p.m. 26.80	Cloudless, cold, early. Cirrus all day. Midday hot sunshine, cool, cloudy afternoon. Clear, starlight night. Very cold south wind.
" 22	40°	...	5 p.m. 26.84	Cloudless and very cold, early. Cloudless all day; soft, cool, southern breezes. Noon 55° indoors. 6.30 p.m. 50° indoors, very cold. Fine, cloudless orange sunset. Slight crimson afterglow.
" 23	7 a.m. 48°	...	8 a.m. 26.93	7 a.m. cloudless and very cold. Strong, gusty south-east wind. 11 a.m. 53° indoors. Very cold and cloudless night, starlight. Midnight 48° indoors.
	29°	...	12 a.m. 26.88	
	7 a.m. 44°	...	10 p.m. 26.88	
	6 p.m. 37°	...	7 a.m. 27.04	
	26°	93° 11 a.m.		
	7 a.m. 41°			

* Thermometer stolen, recovered on the 12th; but could not leave it out, so unable to take day readings.

May 24	25° 8.30 a.m. 55° 8.30 p.m. 37°	...	8.30 a.m. 27.09 8.30 p.m. 26.98	8.30 a.m. cloudless, cold. Grand, cloudless day, soft breezes.
" 25	30° 8.30 a.m. 55° 32°	...	8.30 a.m. 27.04 3 p.m. 26.90 7 a.m. 26.95	8.30 a.m. dense mist, milder. Grand, cloudless day. Cloudless, but heavy mists in valleys, early. Magnificent day. Very fine crimson afterglow.
" 26	7 a.m. 38° 31° 5 a.m. 37°	...	5 a.m. 26.90	5 a.m. damp and cold. By 6 a.m. heavy saturating mist, very cold. By 11.15 cloudless.
" 27				<i>At Botafogo, Rio de Janeiro.</i>
" 30	61° 7 a.m. 61° 10 p.m. 68°	* † ‡	7 a.m. 29.80 6 p.m. 29.78 10 p.m. 29.825	Almost cloudless day. Imperial Observatory, max. 23.9° C., min. 17.5° C.
" 31	63° 7 a.m. 63° 9.30 p.m. 70°	...	7 a.m. 29.825 9 p.m. 29.87	Slight haze early. Heavy storm of rain early morning. Cloudless day.
June 1	67° 7.30 a.m. 68° 10 p.m. 68°	...	7.30 a.m. 30.00 10 p.m. 30.06	Entirely overcast. Heavy nimbus. Much rain 10-12; then fine rain till 6 p.m. Repeated heavy showers throughout evening.
" 2	63° 10 p.m. 64°	...	7.30 a.m. 30.06 10 p.m. 30.05	7 a.m. entirely overcast. Drizzle, showers, and heavy rain from 8 a.m. to 7 p.m. Cloudless by 9 p.m.
" 3	58° 7.30 a.m. 60°	21.7° C.	7.30 a.m. 30.02 11 p.m. 29.96	Cloudless day.
" 4	50° 7.30 a.m. 64° 6 p.m. 61°	98° noon 22.5° C.	7.30 a.m. 29.96 2 p.m. 29.87 6 p.m. 29.87	Ditto.
" 5	52° 7 a.m. 53°	...	7 a.m. 29.89 6 p.m. 29.95 11 p.m. 30.00	Cloudless morning. Cirrus, afternoon. Cloudless night.
" 6	50° 7 a.m. 53°	...	7 a.m. 30.02 6 p.m. 29.95 10 p.m. 30.00	Cloudless day. 5 p.m. thick clouds, soft breeze. 10 p.m. cloudy.
" 7	53° 7 a.m. 60°	...	7 a.m. 30.00	Thick mist early, then cloudless. Cloudy afternoon.

* Having no maximum thermometer, and being in town all day, was unable to register.

† The maxima recorded are those taken at the Imperial Observatory, Rio de Janeiro.

‡ For converting Centigrade readings to Fahrenheit—if x = Cent. reading, then $\frac{9x}{5} + 32^\circ = \text{deg. Fahr.}$

Date.	Min. Thermometer. Fahrenheit.	Max. Ther- mometer. Centigrade.	Barometer.	REMARKS.
June 8	54° 7 a.m. 56°	22°	Inches. 7 a.m. 30.02 2 p.m. 29.88	Cloudless day. Clouds 6-9 p.m.; then clear.
" 9	54° 7 a.m. 56°	25.5°	7 a.m. 29.87 11 p.m. 29.85	Cloudless day.
" 10	56° 7 a.m. 60°	23.4°	7 a.m. 29.89 11 p.m. 29.96	Cloudy early. Cloudless 8 a.m. to noon. Overcast after noon.
" 11	56° 7 a.m. 61°	23.3°	7 a.m. 29.96 10 p.m. 29.87	Cloudless morning. Afternoon and evening slight cirrus. Misty moon.
" 12	58° 7.30 a.m. 63°	26.8°	7.30 a.m. 29.82	Misty sunshine. More or less clouds.
" 13	58° 7.15 a.m. 66°	26.3°	7.15 a.m. 29.82 6 p.m. 29.82	Cloudless early. Misty till noon. Cloudy afternoon, breezes. Cloudless starlight.
" 14	58° 7 a.m. 64°	24.6°	10 p.m. 29.86 7 a.m. 29.95	Entirely overcast all day. Evening, slight rain, strong breezes.
" 15	58° 8 a.m. 62°	30.3°	10 p.m. 29.95 8.30 a.m. 29.97	Heavy rain 8 a.m. Cloudy morning. Fine, hot afternoon, strong breeze.
" 16	47° 7.30 a.m. 52°	20.1°	10 p.m. 30.07 7.30 a.m. 30.12	Cloudless sky. Fine afterglow.
" 17	48° 7.30 a.m. 57°	22.1°	11 p.m. 30.13 7.30 a.m. 30.06	Cloudless day. Faint afterglow. Cloudy evening.
" 18	53° 7.30 a.m. 58°	23.3°	9 p.m. 30.00 7.30 a.m. 30.00	Cloudy till 9 a.m. Cloudless day from 11 a.m.
" 19	58° 7 a.m. 60°	22.4°	10 p.m. 30.07 7 a.m. 30.00	Heavy nimbus all day. Much rain early.
" 20	55° 7 a.m. 60°	23.5°	10 p.m. 30.02 7 a.m. 29.90	Cloudless day. Slight afterglow. Cloudless night.
" 21	54° 7 a.m. 63°	24.5°	7 a.m. 29.90 10 p.m. 29.85	Cloudless day.
" 22	54° 9 a.m. 97° (in sun)	26.8°	9 a.m. 29.85 6 p.m. 29.83	Ditto.
" 23	63° 8 a.m. 66°	25.1°	11 p.m. 29.95 8 a.m. 29.96 10 p.m. 29.90	Early, entirely overcast. Cloudless by 10 a.m. Very hot and sultry day.

"	25	59° 7 a.m. 59°	19°6'	7 a.m. 29°33	cumulus. At sunset, entirely overcast.
"	26	50° 7.30 a.m. 52°	19°8'	7.30 a.m. 30°03	7 a.m. pouring. Showers, drizzle, and heavy rain at intervals all day. Very heavy rain, with gusty wind at night. Slight drizzle occasionally. Strong, high, cold wind all day.
"	27	50° 7 a.m. 55°	19°1'	7 a.m. 30°06	Very fresh wind, overcast early. Cool, cloudy day. Heavy storm-clouds 5 p.m.
"	28	54° 7 a.m. 55°	...	7 a.m. 30°15	Poured heavily during the night. 8 a.m. fine, but cloudy, clouds and mists over mountains. Drizzle till midday. Fine roseate clouds at sunset. Fine night.
"	29	50° 9 a.m. 80° (in sun)	...	9 a.m. 30°00	Cloudless day and night.
"	30	46° 8 a.m. 65°	...	8 a.m. 30°13	Cloudless, fresh morning. Glorious day. Afterglow.
July	1	47° 7 a.m. 53°	...	7 a.m. 30°11	Cloudless, fresh morning. Quite cloudless all day. Cloudless night.
"	2	46° 7 a.m. 56°	...	0.30 a.m. 30°10 7 a.m. 30°16	7 a.m. dense mist. Cloudless day.
"	3	56° 7.30 a.m. 60°	...	.....	Cloudless day. Faint afterglow.
"	4	56° 7.30 a.m. 65°	...	7.30 a.m. 30°06	Cirrus till noon; then cloudless. Afterglow.
"	5	54° 7.30 a.m. 63°	...	7.30 a.m. 30°08 10 p.m. 30°08	Cloudless day. Faint afterglow.
"	6	52° 9 a.m. 96° (in sun)	...	9 a.m. 30°16	Cloudless day.
"	7	51° 7.30 a.m. 72°	...	7.30 a.m. 30°05	Slight mist early. Cloudless day.
"	8	54° 7.30 a.m. 65°	...	7.30 a.m. 29°98 9 p.m. 20°37	Overcast early, sultry. By 9.30 a.m. cloudless.
"	9	54° 7.30 a.m. 65°	...	7.30 a.m. 29°87	Cloudless day.
"	10	56° 7.30 a.m. 68°	21°4'	7.30 a.m. 29°91	Entirely overcast. Heavy nimbus all afternoon. Much rain all evening and night.
"	11	58° 8 a.m. 75°	21°0'	.....	Pouring. Cleared off a little by midday.

Date.	Min. Thermometer. Fahrenheit.	Max. Ther- mometer. Centigrade.	Barometer.	REMARKS.
July 12	60° 8 a.m. 65°	...	Inches. 8 a.m. 29·82 8.30 p.m. 29·85	Entirely overcast. 4.30 p.m. rain. Downpour all evening.
" 13	58° 8 a.m. 63°	21·4°	8 a.m. 29·88 7.30 p.m. 29·83	Fine, steady rain. Cold, wet, windy afternoon. 7.30 p.m. cloudless, cold evening. Lightning to north. Rain 16·40 mm.
" 14	5.30 p.m. 55° 50°	21·9°	8 a.m. 29·95 11 p.m. 30·07	Many clouds, cool breeze. Fine night.
" 15	8 a.m. 56° 51°	...	7.30 a.m. 30·07	Overcast early. Rather cloudy till 2 p.m.; then cloudless till sunset.
" 16	7.30 a.m. 60° 50°	...	7.30 a.m. 30·12 10 p.m. 30·04	Cool early, entirely overcast. Clouds gradually dispersed. By midday cloudless.
" 17	7.30 a.m. 56° 50°	...	7.30 a.m. 30·11	Fresh, cloudless, much mist early. Cloudy till midday; then cloudless.
" 18	7.30 a.m. 65° 53°	...	.....	Slight mist early. Cloudless day. A few clouds, evening.
" 19	8 a.m. 67° 53°	...	.....	Slight mist early. Cloudless day.
" 20	7.30 a.m. 65° 54° (in sun)	...	.....	Cloudless day.
" 21	9 a.m. 95° 53° (in sun)	...	.....	Cloudless till midday; then cumulus, scattered.
" 22	7.30 a.m. 75° (in sun)	...	7 a.m. 30·05 10.30 p.m. 27·55	Heavy mists over hills, early. Cloudless day. Soft breezes. At Petropolis. 10.30 p.m. 60°; felt very cold.
" 23	56° 7 a.m. 61°	...	8 a.m. 27·55 6 p.m. 27·55	At Petropolis. 8 a.m. 80°. Cumulus and nimbus. Cloudy and cool all day.
" 24	...	...	6 a.m. 27·55 9 a.m. 30·10	At Petropolis. Very cold. At Rio de Janeiro. Cloudy and cool day.
" 25	...	...	.....	Cloudless day.
" 26	...	...	10 p.m. 30·04	Misty early. Cloudless day.
" 27	...	...	9 a.m. 29·94	Entirely overcast early. Cloudless day.

NOTE.—In presenting these meteorological notes, and vouching for their accuracy, I regret that they are but scanty and imperfect. My excuse must be inexperience of this work, lack of necessary instruments, and pressure of other duties.

SHORT NOTES ON ANIMALS, BIRDS, AND REPTILES.

MONKEYS (*Quadrupana*).

Primates, these are represented at the present day by a great number of species, but few traces of their genera are found in the cave deposits of Brazil. The most remarkable feature is the number of species with prehensile tails, a character not existing among any of the monkeys of the Old World.* All the South American monkeys are embraced in the family *Cebidæ*.

I had no opportunity of observing closely any but the marmosets, which approach the lemurs. These (*Jacchus*) abound in the forests near Brumado (Entre Rios de Minas), and exist even in the thick woods round the Corcovado, near Rio de Janeiro. I brought home two of the *Jacchus pencillatus*, or black-eared marmoset, which I bought at Bahia. They became very tame. One of them died early in June, and the other June 24, 1885. There were also on board the *Valparaiso* many of the *Jacchus vulgaris*, which has white whiskers instead of black. The native name of the marmoset is sagui.

BATS (*Cheiroptera*).

I collected no specimens of bats; but on examining those at the British Museum, I recognize a species of *Phyllostoma* (not *spectrum*) and *Desmodus rufus*. The latter I came across frequently, and was told that it attacked cattle. I have mentioned my horses having been attacked by a vampire; it may have been the one I now refer to.

Captain Burton † says, when staying at Barroso, near São João del Rey, "Rising before dawn, . . . we found from the blood-clotted hides of our animals that they had suffered severely from the vampire (*Vespertilio naso*, or *Phyllostomus spectrum*) . . .

* Liais, "Climats, Faune," etc., pp. 554, 555.

† "Highlands of Brazil," vol. i. pp. 107, 108.

locally called . . . 'morcego,' andira or guandira. These big ruddy-brown bats, of ghostly flight and cannibal tastes, are confined to the American continent, and they unaccountably prefer particular spots. . . . In São Paulo and Minas, no case of a man having been bitten by the 'ugly spectre bats' came under my notice. . . . However . . . Cabiza de Vaca (1543) was wounded by the leaf-nosed . . . monster near the lake Xarayes. Messrs. Bates and A. R. Wallace, and . . . Mr. Charles H. Williams of Bahia, suffered in person on the Amazons, where the rhinophyll appears to be decidedly anthropophagous. The mode of the vampire's attack has of late years become the subject of debate. The wound is softly and skilfully inflicted. I never saw my horses or mules terrified by it. Prince Max. asserts that it uses its teeth. Gardner believes the puncture is made by the sharp-hooked nail of the thumb. Lieutenant Herndon thinks that the tusks bite, while the nostrils are fitted for a suction apparatus. Others trace the wound to the papillæ of the tongue. . . . The armature of the jaw, however, speaks for itself. It must be like a Vision of Judgment to awake suddenly and to find upon the tip of one's nose, in the act of drawing one's life-blood, that demoniacal face with deformed nose, satyr-like ears, and staring fixed saucer-eyes, backed by a body measuring two feet from wing end to wing end."

Mr. H. W. Bates says that * "the vampire, however, is the most harmless of all bats, and its inoffensive character is well-known to residents on the banks of the Amazons. . . . I opened the stomachs of several of these bats, and found them to contain a mass of pulp and seeds of fruits, mingled with a few remains of insects."

CAPYBARA AND PACA (*Rodentia*).

The capybara, *Hydrochærus capybara* (Cavidæ), is allied to the guinea-pig. It is the largest of living rodents, attaining a length of three or four feet. It is a South American form, leading a semi-aquatic life, to which end its feet are incompletely webbed. It is a harmless, stupid animal, and not unlike a small pig in appearance.†

* "The Naturalist on the River Amazons," vol. ii. p. 333.

† Alleyne Nicholson, "Manual of Zoology."

I did not see this animal, but heard of its appearance frequently on the River Para near Pitanguy. There are many places named after it. Captain Burton mentions * having seen it on the banks of the Parahybúna, near the grand precipice of the Pedra da Fortaleza, on the borders of Minas Geraes and Rio de Janeiro. The Indian name is capi-uara, from *caapiim*, grass, *gudra*, eater. It is gregarious. M. Liais terms it cabiai or capiguara. There is only one existing species. Remains have been found in late tertiary deposits of a species larger than the tapir.

The paca.—I have referred to this animal more than once as being very excellent for food. It is the *Cælogenus* (F. Cuvier) or *Cælogenys* (Illiger) *paca*. M. Liais † points out that both these names are erroneous: first, etymologically; secondly, as not being characteristic of the genus. Thus the name *Cælogenus* is supposed to be derived from *koilos*, a pouch, *genus*, a cheek; then the name should be *Genys-cælus*. But then, again, other rodents exist with this characteristic. The species, which is the only one of the genus, should, according to M. Liais, be termed *Paca Americanus*. It exists throughout Brazil, Guiana, and Paraguay. After dilating on their anatomy, M. Liais says, "They run very quickly, jump well over obstacles, and swim and plunge in a remarkable manner. They generally seek damp forests and the borders of rivers. They do not dig, nor cover up the opening of their burrow with straw, as has been said; but take advantage of the holes dug by other animals, notably those of the tatus. . . . They visit sugar-cane plantations, maize, and potato fields. Their flesh is very delicate (*très recherché*), and they are much hunted, for which purpose dogs are specially trained.

COATI (*Plantigrada*).

These little animals are closely allied to the true bears. I have mentioned seeing two specimens; one in the forest near Paraopéba, the other brought on board for sale at Pernambuco. The former was very fierce, having just been caught, and uttered loud cries, while biting at everything within reach; the latter was

* "Highlands of Brazil," vol. i. p. 43.

† "Climats, Faune," etc., pp. 537, etc.

tame, and a very lovable little creature, with a beautiful skin. They both had very fine eyes.

The chief characteristics of this genus are, according to M. Liais, a very long nose, which is, in fact, a trunk, and a long hairy tail, which is not prehensile. The two specimens I saw twisted their tail round any near object; but, as they were confined, I could not observe whether they used it as an aid to locomotion.

The Indian name is *cuati*, from *cua*, belt, *tim*, nose, which appears to indicate the flexibility of this organ. M. Liais recommends *Cuati* as the generic name; *Nasua* is the recognized appellation.

There are two species: *C. socialis*, *cuati de bandas*, a gregarious species, which flees when pursued; *C. solitaris*, *cuati mondé*, a solitary species, fierce, which attacks and kills dogs. Prince Max. distinguishes the two species; Azara allows only one.

OUNCES (*Digitigrada*).

Onça sussuarána (*Felidae*). Brazilian etymology is phonetic,* so I was hardly surprised to find this name spelt in different ways by M. Liais and Captain Burton. The former has *suçuarana*, the latter *çuçuaranna*, or *çuçurana*.

M. Liais, after describing the jaguars, proceeds to the cougouars or pumas (*Felis concolor*, Linn.), which approach the lion. He says,† "These animals are known in Brazil under the name of *suçuarana*, and two distinct species are there recognized; the true *suçuarana*, called also *onça vermelho* (red ounce), and *suçuarana do lombo preto* (with black loins). The former is the larger.

"The name *Suçuarana* is an alteration of *Çucuacuára*, or *Gua-zouara* (of Azara), and *Soasoarana*, *Cougouacouara*, *Çuguacarana*, *Cougouora*, etc., brought from Guiana by other travellers; and it is also even the origin of the altered name *Cougouar*.

"This name *Çucuacuára* is derived from *çu*, the food, *cuacu*, to cover up, and *ara*, a final syllable often used to describe a habit. This word, therefore, means *he who covers his food*, and is another

* For instance, they write *cachaça* or *caxaça*, for white rum.

† "Climats, Faune," etc., pp. 459, *et seq.*

example of the care with which the Indians observed the habits of the animals, and the interest which is attached to preserving the names given by them. The suçuarana has, in fact, the habit of hiding its prey under an enormous heap of dry leaves, after having eaten a portion of it, and returning to this provision when it is again hungry. It is the only one of the large felidæ of South America which has this habit, of which I am surprised that travellers have not spoken. . . . We will, therefore, preserve the Indian name, so characteristic of its habits, by calling it *Felis suçuarana*."

Captain Burton says,* in addition to what I have already quoted, "There are four large varieties of these felidæ :—

"1. Onça çuçaranna or çuçarana (Mr. Bate's sassú-arána, or the false deer), whence the barbarously corrupted 'Cougouar'—derived through the 'Gouazouara' of Azara. It is variously termed *Felis onça*, or *brasiliensis*, or *concolor*, the last term being the best name. It is one of the biggest. I have seen a brown-red skin five feet eight inches long, not including the tail, yet it is the least dangerous. The range of this puma, or red lion, appears to extend throughout the tropical and temperate zones of the New World. It is evidently the 'painter' (panther) of the United States.

"2. Cangouassú or Cangassú, the largest variety, with smaller rounded spots of a lighter colour, on a dark red-brown skin. Prince Max. informs us that in Bahia it is applied to a small animal whose pelage is marked with smaller black spots.

"3. Onça pintada (painted ounce), also called the jagareté (true or great eater). This '*Felis discolor*' is a beautiful animal, especially when the white field of its maculæ has a light pink blush. . . . It is the most dreaded; it worries and destroys far more than it needs, and, after gorging itself with the blood, it returns at leisure to eat the flesh.

"4. The 'Tigre,' or Onça preta, is the black jaguar, a rare animal now in Brazil, but still found, I am told, on the banks of the Paraguay river."

M. Liais gives an account of the jagareté under the head of

* Vol. ii. p. 21, note.

Jaguars,* giving it the Brazilian name of onça verdadeira or pintada; and likewise mentions the Jaguarapara (river jaguar), a smaller animal, also called onça pintada, of which, he says, it is much fiercer than the preceding. The Indian name was jaguara tyrye, or jaguar to avoid; thence, by an easy transmutation, the popular term 'tigre' of Captain Burton.

"The two species of Suçuarana climb trees. They both flee from men and dogs; even a child on horseback frightens them. They are not seen near much-inhabited places. They chase the deer in the campos,† and make occasional inroads into the flocks, especially the Suçuarana do lombo preto. They frequent caves more than the other Felidæ, and enter them in pursuit of pacas and agoutis."

Of the four species of onça mentioned by Captain Burton, two are placed by M. Liais among the jaguars, one among the pumas, and the remaining species (No. 2) is the ocelot.

OCELOT.

I procured two skins of the grey ocelot, *Felis grisea*, at Pernambuco, near which place the animal is tolerably plentiful. It is known in Brazil by the name of Canguçu, or Acanga-assú (large head).

WOLF, OR LOBO (*Digitigrada*).

Canis jubatus (Desm.), Canidæ. The following extracts from M. Liais's ‡ volume may be of interest in respect to this animal, whose voice I heard occasionally, who passed by my tent one night, but whose footprints alone I saw.

"From the standpoint of food habits (*régime alimentaire*), the two species of the genus *Canis* the furthest removed are the common wolf of Europe, a fierce and sanguinary animal, the most carnivorous of all the species of genus, and the Aguara or Guara of Brazil, *Canis jubatus* of Desmarest, very improperly called in Minas Geraes lobo (the Portuguese word for 'wolf'), and de-

* "Climats, Faune," etc., pp. 445, *et seq.*

† The only sight I had of a deer was the fore-leg of one, sent me from Pitanguy.

‡ Pages 469, 471.

scribed in most of the works on mammology as the wolf of Brazil.

"It is, however, the least carnivorous of all known dogs, and the food it prefers consists of vegetable substances. . . . The name of Aguara, given by the Indians to this animal, imitates its cry, which consists of three loud successive and distinct notes, which nearly represent the syllables 'a-gua-ra,' and resemble the bark of a dog. . . . In the province of Minas Geraes, where this animal is common, Aguara has become Guara; but, owing to the disappearance of the indigenous race, the Portuguese name of 'lobo' is generally substituted. The suppression of the initial *a* is further noticeable in Brazil, not only in this word, but in many other Indian names of animals, as the Aperca, Acuti, etc., now become Prea, Cutia (or coati), etc., probably owing to the habits of abbreviation in use by other tribes in Brazil.*

"The cry of the Guara is heard at an enormous distance; and, in the fine moonlight nights, when this animal prowls over the prairies, it is not rare to hear the three strong intonations of its bark. It is rarer to see the animals themselves, as they carefully avoid man, and hide in the bushes; they do not even attack children; the smallest dog puts them to flight by its bark. . . . The Guara hunts small mammals and the prairie gallinaceæ, but prefers large insects to these, sometimes even serpents. It especially feeds on the bark of trees and fruits, and particularly favours the fruit of the *Solanum lycocarpum*, called by the natives *fruta de lobo* (wolf-fruit)." This tree is very abundant on the extensive bare prairies, and often attains the size of a large apple-tree. It is most handsome, and very conspicuous. The flowers, which are often over an inch across, are of a beautiful purple, with bright orange centre. The leaves are large and glaucous, and the fruit is some six inches in diameter, of a fine sea-green colour. On cutting it asunder, the fruit smells very similar to an

* I often experienced considerable difficulty in understanding the natives, even when I was tolerably *au fait* with the language, owing to the habit of cutting off final syllables, omitting prefixes, and indistinct pronunciation generally. It is somewhat similar to the Lancashire dialect, where "The nearest way is over the stile on the right," was once explained to me as, "T'next way 's o'er t' steel on t' reet."

apple, and I often felt inclined to taste it, but was informed it was very bad to eat; however the ubiquitous and omnivorous pigs devour it when fallen. It is the largest of the *Solanaceæ* that I observed. Solanaceous trees are rare.

The Guara is an animal of the campos; it does not inhabit the forests. Its usual haunt is those parts of the prairies where numerous little bushes grow out of the grass; and during the day it shelters in the shrubs. Owing to its timid habits and avoidance of human habitations, I can only suppose that it visited our camp—some two miles from the nearest village—on the first night, when we had all retired, in search of our chickens. On our making a disturbance, it was so frightened that it never reappeared. None of my men saw it, but heard its cry, and then, after a short time, its footsteps round about the tent.

EDENTATA.

The edentates (or toothless) are the lowest order of monodelphous mammals. The class is represented by three groups, which exist solely in South America—the ant-eaters, armadillos, and sloths; while in the Old World the scaly ant-eaters (*Manidae*) of Asia and Africa, and the armadillo, complete the number of existing families of this peculiar order.

ANT-EATERS (*Myrmecophagidae*).

M. Liais states that “to this family the name edentate really applies, owing to the total absence of teeth.”

There are three species—

1. *Myrmecophaga jubata*, Linn.; *Tamanoir*, Buffon; *Tamandua bandeira*. *Tamandua* is the Indian name for the genus; *bandeira* means “flag” or “standard” in Portuguese. This refers to its tail. I have a very fine bushy tail of a specimen killed in the valley of the Pará. It is a yard long, and each hair is from ten to twelve inches in length.

2. *M. tetradactyla*, Linn.; *M. tamandua*, of Desmarest; *Tamandua*, Buffon; *T. mirim*, or small *tamandua*.

3. *M. didactyla*, Linn.; *Fourmelier*, Buffon.

M. Liais gives a long and interesting account of the anatomy

and habits of the ant-eaters ; but, as I did not come across them, I must refer all students to his elaborate book.*

ARMADILLOS (*Dasypodidæ*).

"The family of the tatús or armadillos is a very natural one, though it can be divided into several genera.† These animals, instead of being covered by fur or hair, have a kind of carapace, formed by an osseous shell, composed of polygonal scales. These scales, moreover, placed in transversal rows, form a shield on the head, an extensive buckler between the shoulders, and another on the posterior. Between these shields are transverse bands, more or less numerous, according to the species, and movable, so as to allow the animal to bend its body. The tail, also, with most species, is covered by scales ; but in some species the scales are reduced to a kind of tubercle. In their general shape all the tatus resemble one another ; they have a thick body, short legs, small head, the muzzle prolonged, and the upper part of the skull flattened ; the eyes are small, and placed sideways ; the ears, horn-shaped, are pointed, rather long, and movable. They have always five toes on their hind-legs, and four or five on the fore-legs, according to the species ; all the toes are armed with long hooked nails, for burrowing.

"By their dental system they are divided into three genera : Priodontes, Dasypus, and Tatusia.

"Priodontes has one species only, and it is the largest animal now existing of the tatu family, the giant armadillo—*Dasypus gigas* (G. Cuvier), *Priodontes giganteus* (Lesson), tatu canastra or tatu assú of the natives. It is rather rare, not found in the valley of the São Francisco, except north of 19° S. lat. It inhabits also the provinces of Mato Grosso and Goyaz, and the north of Paraguay. It digs great burrows. Like the other tatus, its chief food consists of insects (notably, the masses of larvæ in the ant-hills and the great nests of the termites), and of tubers abundant in the campos ; but it also devours the flesh of the dead animals it comes across.

"*Dasypus gilvipes*, Illiger (*Dasypus* with ash-coloured feet), tatu

* "Climats, Faune," etc., p. 355, *et seq.*

† *Ibid.*, pp. 343, *et seq.*

poyu, known in Brazil as tatu péba. This Indian name *péba* apparently comes from the numerous galleries which it burrows rapidly under the soil. . . . Buffon names it *encoubert* (from Portuguese *encoberto*, or covered). Desmarest also terms it *Dasytus encoubert*; Linnæus, *D. sexcinctus*. . . . This species is common in Minas Geraes and the whole valley of Rio São Francisco. It is not, however, the species most widely distributed in these regions. It is also found throughout South Brazil and Paraguay. Its food consists of fruits, tuberous roots, and insects. Its flesh is little esteemed, and is very inferior to that of the tatu-eté. It runs with moderate swiftness, and can be caught when hunted; but it burrows so rapidly and has so many galleries that it generally disappears first. It is impossible to take it in its galleries; they are so multiplied and branched. It comes out by day and night, but especially in the evening. In captivity, when it cannot disappear into the earth, it flattens itself against the ground, so as to be protected by its armour.

"The remaining tatús compose the genus *Tatusia* of F. Cuvier. Therefore, among this class we place the commonest and most widely spread tatú in Brazil, which is called in the Indian tongue tatu-eté (real tatu), for which name the Brazilians have substituted the Portuguese equivalent by calling it tatu verdadeiro.

"Tatu-eté of Buffon, *Dasytus octocinctus* of Linnæus. Prince Maximilian of Neuwied gave it the name of tatu with the long tail, *Tatu longicaudatus*. . . . It is found in all Brazil, as well as in the Guianas and Paraguay. It is hunted for its flesh, which is of very good quality; and because of this peculiarity it is often called in Brazil tatú veadó (venison tatu), and more generally tatú gallinha (chicken tatú), which latter name holds good for another species still more delicate, the tatu mirim, whose white flesh resembles that of a chicken entirely in taste and appearance.

"The *Dasytus uroceras* of Lund was at length recognized by that author as identical with the tatú-eté.

"The food of the tatu-eté consists particularly of roots and insects. In the plantations it especially attacks potatoes, sweet mandioc, and even ordinary mandioc. It also eats sugar-cane, maize, and fallen wild fruits.

"This species is excessively abundant in the prairies. In the

valley of the upper São Francisco, though it does not make as many galleries as the tatu péba, we meet its burrows at every step. It is also seen in more inhabited places, even in the environs of Rio de Janeiro.

"The tatu-eté runs away with great speed, but not as swiftly as the tatu péba. In the campos they disappear very quickly into the numerous holes with which they have honey-combed the ground. They are more nocturnal than diurnal, though often appearing by day. I one day seized by the tail one of these animals, who was beginning a hole to escape into. All my strength was insufficient to drag him out, and it needed the aid of a strong negro. The tatu péba is even stronger than the tatu-eté.

"The tatu mirim (small tatu) which I mentioned just now is also called by the Brazilians tatu de folhas (tatu of leaves), because it lives in the woods in the midst of the dry leaves, under which it hides, without digging burrows like the other tatus. . . . It is widely spread over the province of Minas Geraes, but only in the forests, and is not met with in the campos like the tatu-eté. Its length is scarcely half that of the tatu-eté. . . . Colour, a leaden blackish-grey. . . . Its nails, according to Lund, are never dirty with the argillaceous earth, like those of the other tatus. This fact confirms the statements of the natives, that it does not burrow.

"Another species inhabiting the provinces of Rio de Janeiro, Minas Geraes, and even the whole of Brazil as far as the Guiana, also Paraguay, is the Tatuay of Azara, called also in Brazil Tatu de rabo molle (tatu with a soft tail). It is the *Dasyus uncinatus* or *D. duodecimocinctus* of Linnæus, *D. gymnurus* of Illiger, and *Xenurus nundicaudus* of Lund. Its habits are nearly identical with those of the tatu-eté, but it inhabits forests in preference to the campos. I saw a well-stuffed specimen of this species in the Rua do Ouvidor, Rio de Janeiro, price eighty milreis.

"Another tatu common in the north of Brazil is known in the empire by the name of tatu bola (ball tatu), because it withdraws its head and legs under the carapace and rolls into a ball, entirely protected in this shape by its shell. I have seen this species in the basin of the São Francisco, at the Villa-da-barra-do-Rio-Grande; but it is not met with in the southern parts of the basin. It is common in the province of Piahy. This species is the

Apar of Buffon, *D. trinctus* of Linnæus. . . . It was called tatu apar by the Indians, *apar* meaning 'rolled up' in their language. Therefore, I retain the name of Tatu apar. . . . When rolled into a ball, the strength of two persons is quite insufficient to unroll it, as I assured myself by experiment. . . . The food of this animal consists in fruits, grain, and insects. When rolled up one can throw it to a distance, like a ball from the hand, without its opening or suffering from it.

"The Tatu vela of Azara, known by the name of tatu veludo in Banda Oriental, the *D. villosus* of Linnæus, is probably found in the extreme southern limits of Brazil.

"The Tatu mulita of Azara, *D. hybridus* of Desmarest, is found in the same region as the preceding. . . . It is smaller than the tatu veludo, . . . and may be only a variety of the tatu-eté.

"The Tatu pichy of Azara is also in the same locality as the two preceding species. . . . Its habitat appears to extend to 42° S. lat., where the cold in winter is as strong as about 50° N. lat. It is, perhaps, only a dwarfed race of tatu péba, which it nearly approaches."

SLOTHS (*Bradipodidæ*).

The sloths form a single group; they are phytophagous, and in general appearance closely resemble monkeys. "The sloths . . . are constructed to pass their lives suspended from the under surface of the branches of the trees amongst which they live; and for this end their organization is singularly adapted. The fore-limbs are much longer than the hind-limbs, and the bones of the fore-arm are unusually movable. All the feet, but especially the fore-feet, are furnished with enormously long curved claws, by the aid of which the animal is enabled to move about freely suspended back downwards from the branches. Not only is this the ordinary mode of progression among the sloths, but even in sleep the animal appears to retain this apparently unnatural position. Owing to the disproportionate size of the fore-limbs as compared with the hind-limbs, and owing to the fact that the hind-feet are so curved as to render it impossible to apply the sole to the ground, the sloth is an extremely awkward animal upon the ground, and it has, therefore, recourse to terrestrial progression

only when absolutely compelled to do so. Whilst the name of 'sloth' may thus appear to be a merited one from the point of view of a terrestrial mammal, it is wholly undeserved when the animal is looked upon as especially adapted for an arboreal existence." *

Mr. Waterton says † that in the forest "he travels at a good round pace, and were you to see him, as I have done, passing from tree to tree, you would never think of calling him a sloth."

M. Liais remarks ‡ there are two families—the Unau (*Cholæpus*, Illiger) and the Aï (*Achæus*, F. Cuvier). The Unau of Buffon has two species, of which only one is spread through the forests of Brazil, especially in the north—*Bradypus didactylus* (Linn.), native name preguiça (idleness). It is the largest of the sloths, being thirty inches in length. It can swim across large rivers. It never quits the branches of a cecropia until it has devoured all the leaves. The females carry the young on their belly. This animal is generally nocturnal; when it moves during the day, it is much slower than at night.

Of the genus Aï (Buffon), the oldest known species is the *Bradypus tridactylus* (Linn.), native name preguiça ay-ay.§ Its length is about half that of the Unau. It is found in North Brazil and in the Guianas. The "Aï with the burnt back," *B. ustus* (Linn.), is smaller than the last named, and its fur is blacker.

The collared sloth is the *B. torquatus*, Illiger, *B. Collaris*, Desm., *Achæus torquatus*, Prince Max.

These two last-named species are found in the forest regions of Minas Geraes, Espirito Santo, Bahia, and Pernambuco. I heard of their inhabiting the lower regions of the Rio Para, near the Rio São Francisco.

The whole family of sloths may be said to be parasites of the cecropias, || for the leaves of those trees form almost entirely

* "Manual of Zoology," Dr. Alleyne Nicholson, p. 409.

† "Wanderings in South America."

‡ "Climats, Faune," etc., pp. 338, *et seq.*

§ So called from its plaintive cry of "ai-ai."

|| They are called bicho do Embaüba (beast of the cecropia tree) by the natives.—H. W. Bates, "The Naturalist on the River Amazons," vol. ii. p. 56.

their food. In captivity they may be induced to feed on fig leaves, celery, and soft vegetables; but they are very difficult to keep alive, and suffer long from hunger before they can be led to eat the proffered leaves.

In the daytime, the Aï may be easily caught; in the forests they may drop upon one, and it is necessary to kill them before they relinquish their hold.

The Visconde de Prados told M. Liais of a curious incident which happened to him. Passing one day on horseback through a forest where the taquaras (bamboos) hung over the path, his travelling cloak, which was on his shoulders, was forcibly seized. An Aï, suspended from the bamboos, had hooked itself on to his garment, and he could not make it relinquish its hold. He determined to let it go off when it wished. But the Aï remained hooked on to the cloak during the two leagues (eight miles) M. de Prados travelled to his home, and his men had all the trouble in the world to make the obstinate animal leave hold.

BIRDS (*Aves*).

The genera and species of birds in Brazil are so numerous that, though I had but very little opportunity of doing more than notice them *en passant*, I am able, from notes I took, as to local names and from personal observation, to give a list of some of the more prominent species. I endeavoured to preserve a few skins, but the majority of these were destroyed by the damp and insects.

I have determined the following names, either from specimens in the Natural History Museum at South Kensington, or by the kindness of Mr. Sharpe, curator of that department, or from the following books: "Beiträge zur Naturgeschichte von Brasilien," von Maximilian Prinzen zu Wied, Weimar, 1825-1833; and "Systematische Uebersicht der Thiere Brasiliens . . . Provinzen von Rio de Janeiro und Minas Geraës," etc., von Dr. Hermann Burmeister, Berlin, 1854-1856.

The classification is from "Nomenclator Avium Neotropicalium," by P. L. Sclater and O. Salvin, London, 1873.

Turdus rufiventris, Vieill., *Turdidæ*. Zorzal obscuro y roxo,

Azara ; Sabiah, Prince Max. The sabia thrush. I found nests with eggs, October 26, 1883.

Calliste tricolor, Gmel., *Tanagridæ*. Abundant at Paquetá, in the Bay of Rio de Janeiro. The green-blue-and-yellow tanager.

Orchesticus capistratus, Max., *Tanagridæ*.

Ramphocælus brasilius, Linn., *Tanagridæ*. *Rhamphocælus*, Desm. ; *Tanagra*, Linn. ; *Tijé piranga*, Burm. ; Sangre de boi, or Pitangui, or tapiranga, native names ; Tion krän, in Botocudo (Prince Max.) ; "Prachtvoll kochenillroth," Burm. The crimson tanager.

Ostinops cristatus, Gmel., *Icteridæ*. *Cassicus*, Vieill. ; *Oriolus*, Linn. The crested cassique. *Cacicus cristatus*, see "Homes without Hands," Rev. J. G. Wood, p. 244. Native names, japé or japú ; Jakereiũñ gipakin, Botocudo language (Prince Max.). It builds pensile or hanging nests, six inches across by three or four feet long. Captain Burton mentions * that the trees near Bom Jardim, 12° S. lat., on the São Francisco river, "were tasselled at the branch ends with nests two or three feet long, bags of dry and thorny twigs, opening with a narrow entrance at the upper end, and comfortably lined with soft grass. . . . Here the tenant is called casaca de couro, or 'leather coat.'" He did not see the bird.

Cassicus persicus, Linn., *Icteridæ*. *C. icteronotus*, Vieill. and Swains. ; *Oriolus persicus*, Linn. ; Japui, Prince Max. ; Jakereiũñ, Botocudos ; Merlo, Minas Geraes. The black and yellow oriole.

Mitvulus tyrannus, Linn., *Tyrannidæ*. The scissor-tail. A common small bird on the campos, with two very long black tail feathers.

Furnarius rufus, Gmel., *Dendrocolaptidæ*. *F. fuliginosus*, Rev. J. G. Wood ; Hornero, Azara ; João de Barro, Minas Geraes. The oven bird. Colour, a light reddish brown. Rev. J. G. Wood says † that it generally haunts the banks of the South American rivers. I have found it most abundant everywhere. In the campos, on the branches of nearly every tree, its hemispherical

* "Highlands of Brazil," vol. ii. p. 316.

† "Homes without Hands," pp. 310, 311. Very erroneous sketch of nest and sitting bird.

nests are to be seen, utterly unprotected; they look similar to a small bee-hive, made of very smooth red clay; hence its name John Clay (*barro* = clay or mud). The nest is divided into two stories. For further particulars, see "Homes without Hands."

Xiphorhynchus trochilirostris, Licht., *Certhiadae*. *X. procurvus*, Temminck; Der Sichelspecht mit dem Colibrischnabel, Burmeister. The sickle-woodpecker with a humming-bird's beak. A small reddish-brown, speckled bird, with thin curved beak about two inches in length.

Trochilidae, or humming-birds. These are so numerous and difficult to determine that I must confine myself to those of which I brought home some skins, mostly found near Rio de Janeiro.

Heliodoxa Leadbeateri, Bourc., *Lophornis magnificus*, Vieill.; *Gouldia langsdorffii*, Vieill.; *Calliphlox amethystina*, Gmel.; *Chrysolampis moschitus*, Linn.; *Bellona exilis*, Gmel.; *Clytolæna rubiginea*, Gmel.

The local names are pretty, and, as usual, characteristic: *Beija flor* = flower-kisser; *pica flor* = flower-pecker; *chupa meis* = honey-sucker.

Celeus flavescens, Gmel., *Picidae*. *Picapão da cabeça amarella*, Minas Geraes. The woodpecker with a yellow head. The head has a crest of yellow feathers, and the male has also red cheek feathers. Body and wings, mottled brown and white.

Ramphastos toco, Gmel., *Ramphastidae*. Toucan. Yellow beak with circular black patch at the base. Tucano, Azara.

Ramphastos ariel, Vig.; *R. Temminckii*, Prince Max. Toucan. Black beak, yellow base. Red and yellow breast.

Ramphastos dicolorus, Linn.; Tucai, Azara. Very common in Minas Geraes. Its voice is extremely discordant and harsh, sounding like "râac-râac."

Ara ararauna, Linn., *Psittacidae*. *Macrocerus a.*, Linn.; *Psittacus a.*, Prince Max. The blue macaw. I only saw it in the Bahia market.

Chrysotis levaillantii, Gray, *Psittacidae*. Large green-yellow-and-red parrot from Para. Seen in captivity in Rio de Janeiro and Bahia.

The few skins of parrots that I collected were destroyed by damp, so it is impossible to name the species.

Phleopterynx cunicularia, Mol., *Strigidae*. *Noctua c.*, D'Orbigny; *Strix c.*, Prince Max. Die Eule des Campos (Prince Max.) = the owl of the campos. Curujé, native name. A handsome crested owl, which lives in burrows, presumably vacated by armadillos. Outside their nests I found remains of Buprestidæ, Phænæus, and other Coleoptera, evidently remnants of a repast.*

Milvago chimachima, Vieill., *Falconidae*. *M. ochrocephalus*, Spix; El Chimachima, Azara; Caracaraï or gavião, Minas Geraes. A hawk to which I have repeatedly referred, occurs by itself or in company with *urubus*.

Cathartes urubitinga, Pelzeln., *Cathartidae*. *Vultur atratus*, Wilson; *C. fædens*, Illig.; *C. urubú*, D'Orbigny; Der grauköpfige Urubu, Prince Max.; Urubú, Minas Geraes. Turkey buzzard, a bird I have often mentioned.

Querquedula brasiliensis, Gmel., *Anatidae*. *Anas b.*, Briss and Linn.; Maréca, Pato Ipecutiri, Azara. A wild duck observed in swamps near Rio Camapuão.

Chamæpelis talpacoti, Temm., *Columbidae*. *Columba t.*, Prince Max.; Köuem-m-cudgi, Botocudo. A small reddish-brown dove, abundant in Minas, where it is called pomba rolla. It is very excellent eating, and was called Ortolan by us.

There are many other doves, called pomba, juryty, etc.

Penelope jacucaca, Spix (according to Sclater and Salvin), *Cracidae*. *P. cristata*, Linn. and Gmel.; *P. jacuaçu*, Spix (according to Burmeister); Jacu guaçu, Minas Geraes. Very good to eat.

Odontophorus dentatus, Temm., *Tetraonidae*. *Perdix dentata*, Prince Max.; Capueira; Uru, Azara; Hazarat, Botocudo; Codorno, Minas Geraes. Prince Max. says that the eggs are white, and mentions that Azara speaks of them as violet blue. There are sometimes over a dozen eggs in one nest. I found a nest (December 10, 1883), with six eggs, in some long grass near a marsh. I was told it belonged to this partridge. The eggs were a dark violet brown. Prince Max., however, alluding to Azara's description, says, "Perhaps he confounded them with those of an Ynambu, a remark which Temminck has already made."

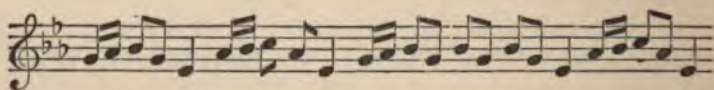
* See "Homes without Hands," p. 24: "On the Burrowing or Coquimbo Owl, *Athene cunicularia*."

Cariama cristata, Linn., *Cariamidæ*. *Rhea Americana*, Burm. and Prince Max.; *Dicolophus cristatus*, Illig.; *Palamedea cristata*, Captain Burton; *Cariama*, *Ceriema*, Prince Max.; *Nhambu guassú*, Marcg.; *Emu*, Burm.; *Siriema*, Minas Geraes. I have often mentioned this bird.

Captain Burton says, "It is about the size of a small turkey, for which it is often mistaken; it runs like a young ostrich; it generally goes in pairs; and it builds in low trees. Its 'bell-note' is not unpleasant, and it is easily tamed." I have seen it in some of the lovely private gardens at Botafogo, Rio de Janeiro.

Crypturus tataupa, Temm., *Tinamidæ*. *Inambu*, Prince Max.; *Ampmering*, Botocudo; *Injambu*, Burm.; *Nhambu*, Minas Geraes. Very good to eat, somewhat resembling black game.

I also observed the following birds, of which I have, unfortunately, no record but their native names, so, of course, cannot determine them. *Tordilho*, a bird like a thrush. *Alma de gato* (cat's soul), a large reddish-brown bird. Captain Burton says it is a species of *Coprophagus* (?). *Tico tico rei*, *cabeça vermelho* (red head), *gallo campino*. Also several canaries (*Fringillidæ*). I was particularly struck by the song of a bird which I could never gain a sight of when singing, and my men had no name for it. It was plentiful in the virgin forest near the Serra do Cortume (about 3400 feet), and in full song only in the spring (October). The notes are as nearly as possible as follows:—



M. Liais* says of the birds of Brazil, "Besides the genus *Rhea*, characteristic of American ornithological fauna, to which belong species of the ancient times, there are two very remarkable and quite special genera: the genus *Cariama* (*Dicolophus*, Illiger; *Microdactylus*, Geoffroy), the *Seriema* of Brazil; and the genus *Tinamou* (*Tinamus*, Lath.; *Crypturus*, Ill.), *Nhambu* of Brazil. These each furnished a species in the quaternary epoch. . . . The

* "Climats, Faune," etc., pp. 302, 303.

Urubus are also an essentially American genus, as are also the partridges, owls, and others. In fact, the quaternary ornithological fauna of Brazil approaches the actual as far as genera goes, and in the greatest of these genera it shows us one species very notably superior in size to existing species." Among other recent fossil remains may also be cited the occurrence of humming-birds, parrots, swallows, goat-suckers, climbers, and rails.

Mr. Henry W. Bates gives some very interesting notes on the habits of humming-birds in the account of his eleven years' sojourn in the districts of the Amazons,* and, referring to the extraordinary similarity of the bird and moth of that name (*Macroglossum*), says that all the natives, even educated whites, firmly believe that one is transmutable into the other. They have observed the metamorphoses of caterpillars into butterflies, and think it not at all more wonderful that a moth should change into a humming-bird.

Mr. Bates, alluding to the urubú vultures, says,† "My cook could not leave the open kitchen at the back of the house for a moment whilst the dinner was cooking, on account of their thievish propensities. Some of them were always loitering about, watching their opportunity, and the instant the kitchen was left unguarded, the bold marauders marched in and lifted the lids of the saucepans with their beaks to rob them of their contents. The boys of the village lie in wait and shoot them with bow and arrow; and vultures have consequently acquired such a dread of these weapons that they may be often kept off by hanging a bow from the rafters of the kitchen."

Mr. Bates devotes several pages‡ to a most careful description of his observations of toucans, and states that "the people of Ega live almost exclusively on stewed and roasted toucans during the months of June and July.§ The birds are then very fat, and the meat exceedingly sweet and tender." He says that

* "The Naturalist on the River Amazons," vol. i. pp. 163, 180, etc.

† *Ibid.*, vol. i. p. 296.

‡ *Ibid.*, vol. ii. pp. 336-344.

§ Stews (*refogados*) and roasts (*asados*) are the standing Brazilian dishes to which I have elsewhere referred, and which so nauseated me that now even (twelve months after) I cannot look at a stew or touch a roast chicken.

"fruit is undoubtedly the chief food of the toucans, and it is in reference to their mode of obtaining it that the use of their uncouth bills is to be sought. Flowers and fruits on the crowns of the large trees of South American forests grow principally towards the end of slender twigs, which will not bear any considerable weight;" the length of the toucan's beak therefore enables it to "reach and devour immense quantities of fruit while seated, and thus its heavy body and gluttonous appetite form no obstacles to the prosperity of the species. It is worthy of note that the young of the toucan has a very much smaller beak than the full-grown bird."

Toucans can be easily tamed, and make interesting pets.

Various remarks on birds will be found scattered throughout my journal, but I will conclude this article by four short notes from my diary.

October 26, 1883.—Found a nest with two eggs of the tico-tico in short grass on a hillside. The eggs were in an advanced condition, the bird being fully formed within.

I came across many birds' nests with eggs till December.

December 3.—Found a remarkable nest among reeds in a swamp; the nest was shaped like a large globular teapot, and was beautifully thatched with twigs. The entrance was through the neck—or spout, to continue the simile. By peeping down this opening, I saw a softly lined bed, whereon were five whitish eggs. The bird was on a neighbouring reed jealously watching my proceedings; it was small, of a light reddish brown, with white throat and chest, and a longish black beak.

December 4.—I saw quite an aviary on one small dead leafless tree, near a swamp—eight canaries, three orioles (*Cassicus persicus*), two scissor-tails (*Milvulus tyrannus*), one John Clay (*Furnarius rufus*), one brown and yellow woodpecker (*Celeus flavescens*), and two small black birds with white breasts.

December 31.—At 6.15 a.m., saw a lovely small humming-bird, about an inch and a half long, feeding at the purple flowers of a species of lavender; his colour was brown, with a brilliant white band of feathers on his breast.

REPTILIA.

This class of vertebrates is divided into nine orders, of which four are represented by living forms and the others are extinct.

The four existing orders are crocodiles, lizards, snakes, and tortoises.

LIZARDS (*Lacertilia*).

These are everywhere abundant. I have fed off some, and have a few preserved in spirits, but none of sufficient interest to record.

SNAKES (*Ophidia*).

On July 7, 1883, I found at the hotel at Paraopéba Station a book on medicine,* which appears to be a valuable work. From it I extracted a few notes on carrapatos, and, finding a list of the snakes of Brazil, I ascertained from the landlord the names of those which occur in that district. As far as I could find out from the local names they are as follows: Cobra cascavel (a rattlesnake), boiquira, or boicinga; the latter an Indian name—as usual, highly scientific—*boi*, or *boya* = a serpent, *cining* = a bell; it is the *Crotalus horridus*, Darwin. Giboia, boa constrictor, plentiful in the forests near Pitanguy. Surucucú, *Lachesis rhombeata*. Surucucu bico de jacca, *Lachesis muta*. Jararaca, *Cophias jararaca*. Cobra coral, *Elaps maregravii*.

I have elsewhere referred to the cobra coral, and a snake called jararacussú, which I occasionally found, as also the jararaca, but was fortunate enough to avoid the rattlesnake, although some of our staff came across it. On the 20th of December, 1883, I saw a long very thin snake; its colour was greenish blue on the upper side, with a bright yellow under side. The snake had just seized a large frog, and I wondered how he would dispose of him. I was attracted by hearing the frog's terrified croak, and, dismounting from my horse, drew near to watch the proceedings. The snake fixed his cold glassy eye on me, as I approached within a

* "Diccionario de medicina popular." Pedro Luiz Napoleão Chernoviz. Paris, 1878.

yard of him, but continued swallowing the frog, swelling out marvellously as it gradually was disappearing. As the last foot of the frog entered the snake's mouth, I gave him a blow on the head, when immediately the frog was disgorged, every bone in his body broken, covered with slime, but still breathing and moving. After killing the snake, I was also compelled to despatch the frog.

I regret much not having preserved any snakes, but the instinct of self-preservation was, perhaps unfortunately, always uppermost; therefore, the reptiles were so disfigured and bruised they were of no use as specimens.

M. Liais says of the cascavel* that it does not inhabit the forests on the coasts, but especially the region of high campos, as the plateau of Barbacena. "Happily, this serpent of so active a poison is very lazy, and does not attack. It only bites when touched or trodden on. My learned friend, the Visconde de Prados, had the opportunity, near Barbacena, of observing several cases of bites by this snake, and furnished me with most interesting information as to its poison. Death follows on the bite almost instantaneously, preceded by blindness. The evil is generally incurable, especially when the bite reaches parts much interlaced by veins. Sometimes, however, the *Crotalus* has but little poison, no doubt because it has recently bitten another animal, and in that case, which is rare, a cure may be effected. The effect of the poison is to dissolve the blood globules and, by increasing its fluidity, to produce hæmorrhage." M. Liais mentions another snake of the same genus, *Crotalus urutú*.

I heard occasionally of persons who were bitten, but was only told of two cures. The first, and more general because easily attainable, making the patient drunk; the other, injection of permanganate of potassium. I always carried in my pocket a small case containing a bottle of this liquid, and a syringe, etc., for injection hypodermically; but am most thankful to say I never had occasion to use it. I was once informed that a man was bitten who wished for the injection; the village apothecary had the necessaries, but, never having tried the operation, refused to perform, and a messenger was sent to me on the matter. I was unable to go, but showed the man my apparatus and explained

* "Climats, Faune," etc., p. 305.

its use, urging him to operate without delay. I shifted camp the next day, and heard no more.

Teetotalers will be shocked by the "drunken process;" but Captain Burton says,* "This is the secret of the cure; the action of the heart is restored, the venom is expelled, and the brain returns to its normal functions."

M. Liais cites the case of other snakes whose bite coagulates the blood. Such is the sorocotinga (*Trigonocephalus brasiliensis*), allied to the *Trigonocephalus rhumbeatus* (*Lachæsis rhumbeata*, Lacépède). He states that this is the only Brazilian snake which attacks man.

In the case of the jararacussú (*Trigonocephalus atrox*), the bite often produces gangrene.

M. Liais states that † the other venomous snakes of Brazil belong to smaller sized genera than the preceding, mostly less formidable than the *Crotalus* and *Trigonocephalus*, and that ammonia counteracts the effects of the bites of many of them.

TORTOISES (*Chelonia*).

On December 24, 1883, a wonderful beast was described to me, and his portrait, a veritable marvel of antediluvian chelonians, was drawn. I was told that the animal abounded in the marshes, and that its bite was more deadly than that of a snake—no recovery possible. One of these awe-inspiring creatures was brought to me next day, a poor little harmless tortoise some six inches across the body, with a remarkably long neck, which it tucked sideways under its shell when looked at or touched. The natives were much frightened at my handling it.

HORNED TOAD (*Amphibia*).

The only species of amphibia of which I preserved a specimen is the handsome and brightly coloured yellow and brown horned toad, *Ceratophrys granosa*—a remarkable instance of protective colouring, as it is impossible to distinguish it a foot or two off, without touching it, when resting on the fallen dead leaves of the forest.

* "The Highlands of Brazil," vol. ii. p. 183.

† "Climats, Faune," etc., p. 307.

SHELLS (*Mollusca*).

List of shells collected in a short ramble by the Bay of Botafogo, Rio de Janeiro.

I am indebted to the kindness of J. Cosmo Melvill, Esq. F.L.S., for naming the specimens.

The classification is from Paetel's "*Conchylien Sammlung*," 1883; from H. and A. Adam's "*Manual of Mollusca*," 1858; and from G. P. Woodward's "*Manual of the Mollusca*," 1880.

Class—GASTEROPODA.

Order—PROSOBRANCHIATA, *M. Edw.*

Family—MURICIDÆ.

Murex, *Linn.*

Salleanus, * *A. Ad.*

sp.*

Triton, *Lam.*

vestitus, *Lam.*

Fam.—BUCCINIDÆ.

Purpura, *Lam.*

biserialis, *Blaine.*

deltoides (?), * *Linn.*

Fam.—NATICIDÆ.

Natica, *Lam.*

dubia, *Ruhy.*

ruficollis, *Reeve.*

Fam.—CERITHIADÆ.

Cerithium, *Brug.*

semi-ferrugineum, *Lam.*

striatissimum, *Sowb.*

Fam.—CALYPTRÆIDÆ.

Crepidula, *Lam.*

aculeata, *Gmel.*

hystrix, *Brod.* (= *aculeata* β).

plana, *Linn.*

Fam.—TURBINIDÆ.

Omphalius, *Phil.*

brasilianus, *Mke.*

Fam.—FISSURELLIDÆ.

Fissurella.

sp.*

Fam.—PATELLIDÆ.

Patelloida, *Quoy.*

subrugosa, *D'Orb.*

[Order—PULMONIFERA.

Fam.—HELICIDÆ.

Bulimus, *Scop.*

oblongus, *Mül.* (= *hæmastoma*, *Amt.*).

This shell is very common everywhere in Minas Geraes, but I never found it with the mollusc inside. Mr. H. W. Bates says that "the land molluscs are the only animals which æstivate; they

* Much worn.

are found in clusters (*Bulimi* and *Helices*), concealed in hollow trees, the mouths of their shells closed by a film of mucus."]

Order—OPISTHOBRANCHIATA.

Fam.—BULLIDÆ.

Bulla, *Lam.*
maculosa, *Mortsu.*

Class—CONCHIFERA, *Lam.* = ACEPHALA.

Section—ASIPHONIDA.

Fam.—ARCADÆ.

Arca, *Linn.* (= *Bysso-arca*).
sp.
Arca, *Linn.* (= *Scaph-arca*).
brasiliana, *Lam.*

Fam.—CARDIADÆ.

Cardium, *Linn.*
two sp. (broken).

Fam.—LUCINIDÆ.

Lucina, *Brug.*
divaricata, *L*
fibula, *Reeve.*

Fam.—VENERIDÆ.

Caryatis.
sp. allied to *laeta*, *Linn.*
Anaitis.
cypria, *Sowb.*

INSECTS.

Order—LEPIDOPTERA.

Division I.—RHOPALOCERA.

List of Butterflies collected by H. C. Dent in Brazil.

All the insects were taken in the province of Minas Geraes, except those marked *, which, in nearly every case, came from the province of Rio de Janeiro.

The nomenclature is from specimens in the British Museum and Hewitson Collections at the Natural History Museum, South Kensington, London.

The classification is from Mr. W. F. Kirby's "Synonymic Catalogue of Diurnal Lepidoptera, with Appendixes," 1871-1877.

Fam. I.—NYMPHALIDÆ, *Swains.*

Sub-fam. I. *Danainæ*, *Bates.*

Danais, *Latr.*
Plexaure, *Godt.*
Eriippus, *Cram.*
Xanthippus, *Feld.*

Lycorea, *Doubl.*

Atergatis, *Doubl.*, *Hew.*

Dircenna, *Doubl.*

Dero, *Hübner.*

Ceratinia, *Hübner.*

Daeta, *Boisd.*

Eupompe, *Hübner.*

- Mechanitis, *Fabr.*
 Lysimnia, *Fabr.*
 Polymnia, var., *Hew.*†
 Ithomia, *Hüb.*
 Phono, *Hüb.*
 Erruca, *Hew.*
 Melinaea, *Hüb.*
 Paraiya, * *Reak.*
 Ethra, *Godt.*
- Sub-fam. II. *Satyrinae*, *Bates.*
 Pierella, *Westw.*
 Nereis, * *Dru.*
 Euptychia, *Hüb.*
 Periphas, *Butl.*
 Electra, *Butl.*
 angularis, *Butl.*
 marmorata, *Butl.*
 ochracea, *Butl.*
 Atalanta, *Butl.*
 Eöus, *Butl.*
 Vesper, *Butl.*
 Phares, *Butl.*
 Necys, *Godt.*
 Quantius, *Godt.*
 sp.
 Taygetis, *Hüb.*
 Xantippe, *Butl.*
 Andromeda, * *Cram.*
- Sub-fam. IV. *Morphinae*, *Butl.*
 Morpho, *Fabr.*
 Anaxibia, * *Esp.*
 Laertes, *Dru.*
 Menelaus, *Linn.*
 Achilles, *Linn.*
 achillæna, *Hüb.*
- Sub-fam. V. *Brassolinae*, *Bates.*
 Brassolis, *Fabr.*
 Astyra, *Godt.*
 Opsiphanes, *Westw.*
- Opsiphanes Syme, * *Hüb.*
 Batea, *Hüb.*
 Inviræ, *Hüb.*
 Dynastor, *Westw.*
 Darius, * *Fabr.*
 Caligo, *Hüb.*
 Demosthenes, * *Perry.*
 Amphimedon, * *Feld.*
 Dasyopthalma, *Westw.*
 Rusina, ‡ *Godt.*
 Creusa, * *Hüb.*
- Sub-fam. VI. *Acraeinae*, *Bates.*
 Acraea, *Fabr.*
 Thalia, § *Linn.*
 Alalia, § *Feld.*
 sp.
- Sub-fam. VII. *Heliconinae*, *Bates.*
 Heliconius, *Latr.*
 Eucrate, * *Hüb.*
 Apseudes, * *Hüb.*
 Besckii, || *Mén.*
 Satis, * *Weym.*
 Eueides, *Hüb.*
 Dianasa, *Hüb.*
- Sub-fam. VIII. *Nymphalinae*, *Bates.*
 Colænis, *Hüb.*
 Dido, *Linn.*
 Phærusa, *Linn.*
 Phærusa, var. ¶
 Julia, *Fabr.*
 Agraulis, *Boisd.*
 Juno, *Cram.*
 vanillæ, *Linn.*
 Atella, *Doubl.*
 Claudia, *Cram.*
 Phyciodes, *Hüb.*
 Liriope, *Cram.*
 Claudina, *Esch.*
 Mazaria, *Feld.*

† An unnamed var. in *Hew. Coll.*‡ One specimen only in *Brit. Mus. Coll.* I have two.

§ Very abundant. || Very abundant near Entre Rios, Brumado.

¶ Pale var., *Brit. Mus. Coll.*

Eresia, <i>Boisd.</i>	Marpesia, <i>Hüb.</i>
Langsdorfii, <i>Godt.</i>	Thetis, <i>Fabr.</i>
Hypanartia, <i>Hüb.</i>	Victorina, <i>Blanch.</i>
Zabulina, <i>Godt.</i>	Steneles, * <i>Linn.</i>
Pyrameis, <i>Hüb.</i>	Heterochroa, <i>Boisd.</i>
Myrinna, † <i>Doubl.</i>	Syma, <i>Godt.</i>
brasiliensis, <i>Moore.</i>	Gerona, || <i>Hew.</i>
Junonia, <i>Hüb.</i>	sp. ¶
Lavinia, <i>Cram.</i>	Aganisthos, <i>Boisd.</i>
Anartia, <i>Hüb.</i>	Orion, <i>Fabr.</i>
Jatrophae, <i>Linn.</i>	Acheronta, <i>Fabr.</i> **
Amalthea, <i>Linn.</i>	Prepona, <i>Boisd.</i>
Eunica, <i>Hüb.</i>	Demophon, * <i>Linn.</i>
Margarita, <i>Godt.</i>	Smyrna, <i>Hüb.</i>
Myscelia, <i>Doubl.</i>	Blomfieldia, * <i>Fabr.</i>
Orsis, <i>Dru.</i>	Hypna, <i>Hüb.</i>
Epicalia, <i>Westw.</i>	Clytemnestra, var. β . <i>Hüb.</i>
Numilia, * <i>Cram.</i>	neri, * <i>Bull.</i>
Sabrina, ‡ <i>Hew.</i>	Paphia, <i>Fabr.</i>
Eubagis, <i>Boisd.</i>	Halice, * <i>Godt.</i>
Agacles, <i>Dalm.</i>	Psammis, * <i>Feld.</i> , var.
Tithia, <i>Hüb.</i>	Siderone, <i>Hüb.</i>
Mylitta, <i>Cram.</i>	Rogerii, <i>Godt.</i>
Callicore, <i>Hüb.</i>	Isodora, * †† <i>Cram.</i>
Eluina, § <i>Hew.</i>	Fam. II.—LEMONIIDÆ, <i>Kirby.</i>
Candrena, <i>Godt.</i>	Sub-fam. II. <i>Nemiobiina</i> , <i>Bates.</i>
Catagramma, <i>Boisd.</i>	Eurybia, <i>Hüb.</i>
Hydaspes, <i>Dru.</i>	Dardus, <i>Fabr.</i>
Hydarnis, <i>Godt.</i>	Halimede, <i>Hüb.</i>
Sorana, <i>Godt.</i>	Mesosemia, <i>Hüb.</i>
Gynecia, <i>Doubl.</i>	Eumene, <i>Cram.</i>
Dirce, * <i>Linn.</i>	sp.
Ageronia, <i>Hüb.</i>	Sub-fam. IV. <i>Lemoniina</i> , <i>Kirby.</i>
Feronia, <i>Linn.</i>	Panara, <i>Westw.</i>
Ferentina, <i>Godt.</i>	Thisbe, * <i>Fabr.</i>
Amphinome, <i>Linn.</i>	Lymnas, <i>Blanch.</i>
Arete, <i>Doubl.</i> and <i>Hew.</i>	Unxia, * <i>Hew.</i>
Didonis, <i>Hüb.</i>	Lycisca, <i>Hew.</i>
Biblis, * <i>Fabr.</i>	

† Closely allied to *P. Cardui*.

‡ Loc. Minas Geraes, two Brit. Mus. Coll., four Hew. Coll.

§ Described by Hewitson as one of the most beautiful of the genus.

|| One specimen only in Hew. Coll.

¶ May be diminutive form of *Gerona*.** *Megistanis Cadmus*, *Cram.* (Brit. Mus.).

†† These two insects have marvellous protective colouring, under side exactly similar to dry leaf.

- Diorhina, *Mar.*
 Butes,* *Linn.*
 Emesis, *Fabr.*
 fastidiosa, *Mén.*
 Calydna, *Westw.*
 castanea, *Pritho.*
 Charis, *Hüb.*
 Theodora, *Feld.*
 Avius, *Cram.*
 Cadytis, *Hew.*
 Cæneus, *Linn.*
 Perone, *Doubl.* and *Hew.*
 sp.
 Apodemia, *Feld.*
 Epulus, *Cram.*
 Echenais, *Hüb.*
 densemaculata, *Hew.*
 Nymphidium, *Fabr.*
 Calyce, *Feld.*
 azanoides, *Butl.*
 Lamis, *Cram.*
 Stalachtys, *Hüb.*
 Phlegia, *Cram.*
 phlegethetiza, *var.*
 Susanna, *Fabr.*
- Fam. III.—LYCÆNIDÆ, *Steph.*
 Cûpido, *Schrank.*
 Thius, *Hüb.*
 Catalina (?), *Fabr.*
 Cassius, *Hew.*
 two species undetermined.
 Tmolus, *Feld.*
 two species undetermined.
 Thecla, *Fabr.*
 imperialis,* *Cram.*
 Hemon, *Cram.*
 Marsyas, *Linn.*
 Phaleros, *Linn.*
 Palegon, *Cram.*
 Melibæus, *Fabr.*
 Melibæus, *var.*
 Tarania, *Hew.*
- Thecla* *Herodotus*, *Fabr.*
 sp.
- Fam. IV.—PAPILIONIDÆ, *Leach.*
 Sub-fam. I. *Pierina*, *Swains.*
 Euterpe, *Swains.*
 Tereas, *Godt.*
 Hesperocharis, *Feld.*
 anguitia, *Godt.*
 Dismorphia, *Hüb.*
 Methymna,* *Godt.*
 Melia,* *Godt.*
 Melite,* *Linn.*
 Thermesia, *Godt.*
 Critomedia,* *Hüb.*
 Psamathe, *Fabr.*
 Nehemia, *Boisd.*
 Cyra, *Doubl.*
 Leucidia, *Doubl.*
 Elvina, *Godt.*
 Eurema, *Hüb.* (= *Terias*, *Swains.*).
 xanthochlora, *Köll.*
 Deva, *Doubl.*
 Neda, *Godt.*
 Palmyra, *Poc.* (allied to).
 Lydia, *Feld.*
 Elathea,† *Cram.*
 Plataea, *Feld.*
 Mycala, *Feld.*
 Rhodia (?), *Feld.*
 Albula, *var. a Sinœe*, *Godt.*
 About sixteen species or varieties undetermined.
 Daptonoura, *Butl.*
 limnoria, *Godt.*
 Ilaire, *Godt.*
 sp.
 Perrhybris, *Hüb.*
 Iphigenia, *Godt.*
 Pyrrha, *Fabr.*
 Catopsilia, *Hüb.* (= *Callidryas*, *Boisd.*).
 Eubule, *Linn.*

† This sp. and its allies very abundant in valley of Rio Brumado, near Entre Rios, alt. about three thousand feet.

Catopsilia Leachiana, <i>Godt.</i>	Thymele Eurycles, <i>Latr.</i>
Philea, <i>Linn.</i>	undulatus, <i>Hew.</i>
Argante, <i>Fabr.</i>	Catillus, <i>Cram.</i>
Cipris, <i>Fabr.</i>	Proteus, <i>Linn.</i>
neocypris, <i>Hüb.</i>	Exadeus, <i>Cram.</i>
Trite, <i>Linn.</i>	Aunus, <i>Fabr.</i>
Statira, <i>Cram.</i>	Telegonus, <i>Hüb.</i>
Gonepteryx, <i>Leach.</i>	fuligator, * <i>Walch.</i>
Clorinde, <i>Godt.</i>	Naxos, <i>Hew.</i>
	Anaphus, <i>Cram.</i>
Sub-fam. II. <i>Papilioninae</i> , <i>Suains.</i>	Spathelepia, <i>Butl.</i>
Papilio, <i>Linn.</i>	Evelinda, <i>Butl.</i>
Polydamas, <i>Linn.</i>	Pyrrhopyge, <i>Hüb.</i>
Harrisianus, * <i>Suains.</i>	Phidias, <i>Linn.</i>
Lysithous, <i>Hüb.</i>	Acastus, <i>Cram.</i>
Asius, <i>Fabr.</i>	Xanthippe, <i>Latr.</i>
Cixius, <i>Gray.</i>	versicolor, <i>Latr.</i>
Nephalion, <i>Godt.</i>	Erycides, <i>Hüb.</i>
Æneides (?), <i>Esp.</i>	Palemon, <i>Cram.</i>
Zacynthus, * <i>Fabr.</i>	Carystus, <i>Hüb.</i>
Dardanus, * <i>Fabr.</i>	Sinon, <i>Cram.</i>
Agavus, * <i>Dru.</i>	Corydon, <i>Fabr.</i>
Proneus, <i>Hüb.</i>	Pamphila, <i>Fabr.</i>
Bunichus, <i>Hüb.</i>	Epictetus, <i>Fabr.</i>
Ascanius, * † <i>Cram.</i>	Æpitus, <i>Hüb.</i>
Ascanius, var. * ‡	umbrata (?), <i>Esch.</i>
Perrhebus, * <i>Boisd.</i>	sp., <i>Hew. Coll.</i>
Grayi, <i>Boisd.</i>	Phlebodes, <i>Butl.</i> (?)
Evander, <i>Godt.</i>	two species.
Androgeos, <i>Cram.</i>	Pyrgus, <i>Hüb.</i>
Lycophron, <i>Hüb.</i>	Omrina, <i>Butl.</i>
Mentor, * <i>Boisd.</i>	Syrichthus, § <i>Fabr.</i>
Torquatinus, <i>Esp.</i>	Leucochitonea, <i>Wallengr.</i>
Torquatus, * <i>Cram.</i>	Arsalte, <i>Linn.</i>
Thoas, * <i>Linn.</i>	sp.
Deileon, * <i>Feld.</i>	Butleria, <i>Kirby.</i>
Bellerophon, <i>Dalm.</i>	Caicus? <i>Hew.</i>
Protesilaus, <i>Linn.</i>	Achlyodes, <i>Hüb.</i>
	Sebaldus, <i>Fabr.</i>
Fam. V.— <i>HESPERIDÆ</i> , <i>Leach.</i>	Hadina, <i>Butl.</i>
Thymele, <i>Fabr.</i>	Begga, <i>Prittw.</i>
Simplicius, <i>Stole.</i>	obscurus (?), <i>Hüb.</i>
	sp.

† No ♂ in Brit. Mus. Coll., only in Hew. Coll.

‡ Tawny var. not in Brit. Mus. Coll. or Hew. Coll.

§ Very abundant.

Antigonus, <i>Butl.</i> (?)	Helias palpalis, <i>Latr.</i>
Erosus, <i>Hüb.</i>	Lacæna, <i>Hew.</i>
Phagesia, <i>Hew.</i>	sp. <i>Brit. Mus. Coll.</i>
Helias, <i>Butl.</i> (?)	sp.
phalenoides, <i>Hüb.</i>	

224 species determined.

35 „ undetermined.

Total 259 species.

List of Butterflies described as from Minas Geraes, but which are not in my collection.

Quoted from "Catalogue of the Collection of Diurnal Lepidoptera, formed by the late W. C. Hewitson," by W. F. Kirby, 1879; and from "A Synonymic Catalogue of Diurnal Lepidoptera, with Appendixes," by W. F. Kirby, 1871-1877. Those marked * are from the Hewitson Collection.

Fam. I.— <i>NYMPHALIDÆ</i> , <i>Swains.</i>	Pedaliodes, <i>Butl.</i>
Sub-fam. I. <i>Danainæ</i> , <i>Bates.</i>	Phanias, <i>Hew.</i>
Ituna, <i>Doubl.</i>	
Ilione, * <i>Cram.</i>	
Ithomia, <i>Doubl.</i>	Sub-fam. V. <i>Brassolinæ</i> , <i>Bates.</i>
Jessica, <i>Hew.</i>	Opsiphanes, <i>Westw.</i>
Acilla, <i>Hew.</i>	sp. *
Melinaea, <i>Hüb.</i>	Penetes, <i>Westw.</i>
fenella, <i>Hew.</i>	Pamphanis, <i>Doubl.</i> and <i>Hew.</i>
	Caligo, <i>Hüb.</i>
	hemichroa, <i>Butl.</i>
Sub-fam. II. <i>Satyrina</i> , <i>Bates.</i>	
Pronophila, <i>Hew.</i>	Sub-fam. VIII. <i>Nymphalina</i> , <i>Bates.</i>
Phanias, * <i>Hew.</i>	Phyciodes, <i>Hüb.</i>
Eteona, <i>Westw.</i>	Orthia, <i>Hew.</i>
Tisiphone, * <i>Boisd.</i>	Cybdelis, <i>Hew.</i>
Lymanopoda, <i>Westw.</i>	Tatila, * <i>Herr. Schöff.</i>
sp. *	Epiphele, <i>Doubl.</i>
Tisiphone, <i>Hüb.</i>	Merione, * <i>Fabr.</i>
Hercyna, * <i>Hüb.</i>	Hübneri, * <i>Hew.</i>
Euptychia, <i>Hüb.</i>	Catagramma, <i>Boisd.</i>
vestigiata, <i>Butl.</i>	Clymena, * <i>Cram.</i>
armilla, <i>Butl.</i>	Thamyras, <i>Mén.</i>
peculiaris, <i>Butl.</i>	Selima, † <i>Guén.</i>
stelligera, <i>Butl.</i>	Ageronia, <i>Hüb.</i>
straminea, * <i>Butl.</i>	Fornax, * <i>Hüb.</i>

† *Cynosura*, * *Hew.*

Pyrrhogyra, *Hüb.*
 Ophni,† *Butl.*
 Heterochroa, *Boisd.*
 Abia,* *Hew.*
 Apatura, *Fabr.*
 Laurentia,* *Godt.*
 Paphia, *Fabr.*
 Ateo,* *Druce.*
 Appias,* *Hüb.*
 Otrere,* *Hüb.*

Fam. II.—LEMONIIDÆ, *Kirby.*
 Sub-fam. II. *Nemobiina*, *Bates.*
 Mesosemia, *Hüb.*
 Odia,* *Godt.*
 Veneris,* *Butl.*

Sub-fam. IV. *Lemoniina*, *Kirby.*
 Panara, *Westw.*
 Aureizona, *Butl.*
 Lymnas, *Blanch.*
 Xenia, *Hew.*
 Amarynthis, *Hüb.*
 Bocchoris,* *Hew.*
 monogramma,* *Bates.*
 Emesis, *Fabr.*
 Fatimella,* *Westw.*
 sp.*
 Nymphidium, *Fabr.*
 Erymanthus, *Mén.*
 Ethelinda, *Hew.*
 Theope, *Moore.*
 Tisiphone,* *Westw.*
 pieridioides,* *Feld.*

Fam. III.—LYCÆNIDÆ, *Steph.*
 Thecla, *Fabr.*
 Badeta, *Hew.*
 Cydia,* *Hew.*
 Argerona, *Hew.*
 Scoteria, *Hew.*

Fam. IV.—PAPILIONIDÆ, *Leach.*
 Sub-fam. I. *Pierina*, *Swains.*
 Euterpe, *Swains.*
 Swainsonii,* *Gray.*
 Dismorphia, *Hüb.*
 acraeoides, *Hew.*
 Terias, *Swains.*
 two species unnamed,* *N.S.*

Fam. V.—HESPERIDÆ, *Leach.*
 Thymele, *Fabr.*
 Aminias, *Hew.*
 Eudamus, *Swains.*
 Apastus,* *Cram.*
 Spathelepia, *Butl.*
 Elaites, *Hew.*
 Pyrrhopyge, *Hüb.*
 Charybdis,* *Westw.*
 Amyclas,* *Cram.*
 Antias,* *Feld.*
 Socrates, *Mén.*
 Rhacia, *Hew.*
 Myscelus, *Hüb.*
 varicolor, *Mén.*
 Proteides, *Hüb.*
 Phalestra, *Hew.*
 Leucochitonea, *Wallengr.*
 Leucola, *Hew.*

In Mr. Kirby's catalogue of all known Rhopalocera, including appendixes up to 1877, thirty-five species are marked as from Minas Geraes; and in the Hewitson Collection seventy-one named and eight unnamed species from the same province, out of a total of four or five thousand species. In Mr. Hewitson's "Exotic Butterflies," he figures nineteen species from Minas Geraes, while the Amazons are represented by 232, Ecuador by 175, and New Granada by 80 coloured drawings, besides many others from all parts of the world.

† Tiphus,* *Cram.*

Div. II.—HETEROCERA.

List of Moths collected by H. C. Dent in Brazil.

All the insects were taken in the province of Minas Geraes, except those marked *, which were collected from the neighbourhood of Rio de Janeiro.

The nomenclature is from specimens in the British Museum Collection. I have also referred to Lederer's "Wiener Entomologischer Monatschrift," vol. vii.

The classification is from "List of the Lepidoptera Heterocera in the Collection of the British Museum," 1854, etc., by Francis Walker, F.L.S. I have also examined most carefully MM. Boisduval and Guénée's "Histoire Naturelle des Insectes. Species général des Lépidoptères Hétérocères," Paris, 1852-1857. This book, however, is incomplete. Dr. J. A. Boisduval issued, in 1874, the volume on "Sphingidæ, Sesiidæ, and Castniidæ:" but, owing to his death, the parts on "Zygænidæ" and "Bombycites" have never appeared.

Fam. I.—SPHINGII.

Sub-fam. *Sphingidæ*.

Eupyrrhoglossum.

Ceculus, * *Cram*.

Chærocampa, *Dup*.

tersa, * *Drury*.

Pachylia, *Boisd*.

ficus, * *Linn*.

Macrosila, *Boisd*.

Hannibal, * *Cram*.

Amphonyx.

Tapayusa, * *Moore* (N.S.).

Sphinx, *Linn*.

sp. allied to *gordius* (?) *.

Fam. III.—CYDIMONII.

Sæmatura, *Dalm*.

Diana, * *Guén*.

Urania, *Latr*.

brasilensis, * *Swains*.

Fam. IV.—CASTNII.

Castnia.

Fons-columbii, * *Latr* and *Godt*.

Euphrosyne, var. (?) *

Ardalus, * *Dalm*.

Chremes, * *Jones*.

Fam. V.—ZYGÆNIDÆ.

Isanthrene.

incendiaria, * *Hübner*.

Chalciope, * *Hübner*.

Cosmosoma.

erubescens, *Butl*.

Eurota.

picta, var.

Charidea.

jucunda, *Walk*.

Saurita.

cassandra, * *Linn*.

Fam. VI.—BOMBYCITES.

Sub-fam. *Lithosiidæ*.

Scea.

auriflamma, *Hübner*.

sp.

Eucyane.

melaxantha, * *Hübner*.

Chrysauge.

chrysomelas, *Walk*.

Melanchroia.	Phricodia.
Asteria, <i>Hüb.</i>	ursina, <i>Walk.</i>
tepens, <i>Walk.</i>	sp.
Deiopeia.	Eacles.
ornatrix, <i>Linn.</i>	Laocoön, <i>Cram.</i>
pura, <i>Butl.</i>	
Eudule.	Sub-fam. <i>Bombycidae.</i>
invaria, <i>Walk.</i>	Megalopyge.
Phæochlæna.	undulosa.
tendinosa, <i>Hüb.</i>	sp.
	Gasina.
Sub-fam. <i>Arctiida.</i>	sp.
Idalus.	Macromphalia.
Erythronotus, <i>Herr. Sch.</i>	sp.
Paracles.	Adelocephala.
tricolor (?).	jucunda,* <i>Walk.</i>
Halesidota.	Colla.
strigulosa, <i>Walk.</i>	glauescens,* <i>Walk.</i>
bipunctata, <i>Walk.</i>	Trilocha.
two species.	sp.
Phæoptera.	Olceclostera.
breviuscula, <i>Walk.</i>	sp.
Claphe.	Leptosphetta (?).
sp.	sp.
Massicyta.	Sub-fam. <i>Cossida.</i>
fusca, <i>Walk.</i>	Langsdorfia.
	Franckii, <i>Hüb.</i>
Sub-fam. <i>Liparida.</i>	Sub-fam. <i>Hepialida.</i>
Penora.	Phassus.
diaphana, <i>Cram.</i>	sp.*
	sp. N. S.
Sub-fam. <i>Saturniida.</i>	Fam. VII.—NOCTUITES, <i>Walk.</i>
Attacus.	Sub-fam. <i>Leucanida, Gn.</i>
sp.	Leucania, <i>Ochs.</i>
Automeris.	rivorum (?), <i>Gn.</i>
illustris,* <i>Walk.</i>	three species undetermined.
melanops,* <i>Walk.</i>	
convergens,* <i>Walk.</i>	Sub-fam. <i>Hadenida.</i>
cruenta, <i>Walk.</i>	Dysodia, <i>Feld.</i>
Hyperchiria.	sp.
sp., <i>Brit. Mus.</i>	Sub-fam. <i>Episemida.</i>
Dirphia.	Perigea, <i>Gn.</i>
sp.	subaurea,† <i>Gn.</i>
Arsenura.	
xanthopus, <i>Walk.</i>	

† Plentiful in December and January.

Sub-fam. *Noctuidæ*, *Boisd.**Agrotis*, *Ochs.*

three species undetermined.

Sub-fam. *Bolinidæ*, *Gn.**Bolina*, *Dup.**fasciolaris*, *Walk.*

sp.

Sub-fam. *Hypocalidæ*.*Hypocala*, *Gn.**Andremona*, *Gn.*Sub-fam. *Ophideridæ*.*Ophideres*, *Boisd.**scabellum*, *Gn.*Sub-fam. *Erebidae*, *Gn.**Letis*, *Hüb.**Alauda*, *Gn.**Thysania*, *Dalm.**Agrippina*, *† *Gn.**Erebus*, *Latr.**Odora*, *Drury.*Sub-fam. *Poaphilidæ*, *Gn.**Phurys*, *Gn.**helvina*, *Gn.**lineolaris*, *Gn.*

two species undetermined.

Sub-fam. *Remigida*, *Gn.**Remigia*, *Gn.**subsignata* (?), *Walk.*Fam. VIII.—PSEUDODELTOIDÆ, *Gn.*Sub-fam. *Thermesidæ*.*Capnodes*, *Gn.**turtur*, *Feld.*Fam. IX.—DELTOIDITES, *Latr.*Sub-fam. *Platydidæ*, *Gn.**Geroda*, *Walk.*

sp.

Hypena, *Treit.**pilosalis*, *Gn.*Sub-fam. *Herminidæ*, *Duponch.**Bocana*, *Walk.**pharusalis*, *Walk.*

sp.

Palthis, *Hüb.**hammatifera*, *Hüb.*

two species undetermined.

Fam. X.—PYRALITES, *Gn.*Sub-fam. *Pyralidæ*, *Gn.**Pyralis*, *Linn.*

sp.

Sub-fam. *Asopidæ*, *Gn.**Samea*, *Gn.**ecclesialis*, *Gn.**castellialis*, *Gn.**Agathodes*, *Gn.**designalis*, *Gn.**Leucinodes*, *Gn.**elegantalis*, *Gn.*Sub-fam. *Margaredidæ*, *Gn.**Glyphodes*, *Gn.**sybillalis*, *Walk.*Sub-fam. *Botydæ*, *Gn.**Botys*, *Latr.**scillalis*, *Walk.**ostrealis*, *Gn.**helcitalis*, *Walk.**amplalis*, *Gn.**dryalis*, *Walk.**illutalis*, *Gn.**dorysalis*, *Walk.*

two species undetermined.

Pionea, *Gn.**scripturalis*, *Gn.*Fam. XI.—GEOMETRITES, † *Newm.*Sub-fam. *Ennomidæ*, *Gn.**Gynopteryx*, *Gn.**calbisaria*, *Walk.**rhombaria*, *Gn.*

sp.

† The largest known moth, twelve inches across the wings.

‡ *Phalenites*, *Gn.*

Eurymene, <i>Dup.</i> sp.	Sub-fam. <i>Acidalidæ</i> , <i>Gn.</i> <i>Acidalia</i> , <i>Dup.</i> five species undetermined.
Azellina, <i>Gn.</i> crocallaria, <i>Gn.</i>	<i>Arcobara</i> , <i>Walk.</i> microniata, var.
Synemia, <i>Gn.</i> sp.	Sub-fam. <i>Macaridæ</i> , <i>Gutn.</i> <i>Macaria</i> , <i>Steph.</i> enotata, † <i>Gn.</i>
Cannagara, <i>Walk.</i> sp.	Sub-fam. <i>Zerenidæ</i> , <i>Gutn.</i> <i>Panthera</i> , <i>Hüb.</i> pardalaria, <i>Hüb.</i>
Sub-fam. <i>Urapterigidæ</i> , <i>Gn.</i> <i>Dysdæmonia</i> , <i>Hüb.</i> <i>Boreas</i> , * † <i>Hüb.</i>	Sub-fam. <i>Larentidæ</i> , <i>Gutn.</i> <i>Scordylia</i> , <i>Gutn.</i> conduplicaria, <i>Gn.</i> <i>Scotosia</i> , <i>Steph.</i> sp. <i>Pterocypha</i> , <i>Herr. Sch.</i> sp.
Sub-fam. <i>Boarmidæ</i> , <i>Gutn.</i> <i>Boarmia</i> , <i>Treits.</i> illaudata, <i>Walk.</i> <i>Tephrosia</i> , <i>Boisd.</i> sp. <i>Cerotracha</i> , <i>Gn.</i> licornaria, <i>Gn.</i>	Sub-fam. <i>Hedylidæ</i> , <i>Gutn.</i> <i>Venodes</i> , <i>Gn.</i> napiaria, <i>Gn.</i>
Sub-fam. <i>Geometridæ</i> , <i>Gn.</i> <i>Geometra</i> , <i>Linn.</i> sp.	

Also about 19 species of Noctuzæ, Tortrices, etc., genera undetermined.

83 species determined.

47 species undetermined.

19 species, genera undetermined.

149 Total number of species collected.

THE THEORY OF EVOLUTION.

Mr. W. C. Hewitson § refers to a paper by Mr. Roland Trimen, || wherein, speaking of the wonderful metamorphoses of a species of *Papilio*, the latter says, "Entomologists, no less than naturalists generally, appeared content with a child-like wonder at this and kindred facts, and let them pass as things inscrutable until Mr. Darwin gave us a rational explanation of these phenomena." Mr. Hewitson remarks, "I must say, and I hope that

† Represented by sketch only in Brit. Mus. Coll. (placed among *Satur-niide*); but it is certainly a Geometer, and presents similarities to the *Ennomida* and *Boarmidæ*. Is allied to genus *Chorodna* from Hindostan; resembles *Semiothisa*, *Feld.*

‡ Very closely approaches the English *M. notata*.

§ "Exotic Butterflies," vol. iv.

|| "Trans. Linn. Soc."

I may do so without giving offence to any one, that I prefer the child-like attitude of former naturalists to the childish guesses of those of the Darwinian school. Mr. Trimen, if I understand him rightly, gives this (may I call it a dream?) as a supposition only. Mr. Bates, in his address as President of the Entomological Society, speaks of it as an established fact."

I have constantly endeavoured to oppose the theory of evolution which is now so widely accepted, and for this reason—that while there are some who, believing in revelation, consider evolution to be one of the natural laws ordained by the Creator, there are others who uphold the theory in order to throw back the idea of creation to an immeasurable distance, and thus, even if they do not go so far as disbelieving in a Supreme Being, prepare the way for the denial of a personal God Who in any way influences the present order of Nature, and of Whom, therefore, we are individually independent. This destroys all the foundations of personal religion.

There is a God. He has given us two Books. He reveals Himself to the spiritual part of our nature in His Word, and to our bodily and intellectual capacities in His Works—in Nature. The two revelations coming from one source must agree.

There is, however, nowadays an infinite number of shades of opinion on these subjects, and there is also a conflict between science and religion, which is most deplorable, especially as it has, I fear, driven many into unbelief, or at least into honest doubt; and while it is very easy to explain the origin of the evil, it is more difficult to correct it.

Whereinsoever scientific men have attempted to disprove certain spiritual truths or doctrines, such as the efficacy of prayer, the possibility of miracles, etc., they have dealt with things outside their province. Mathematics, physics, biology, do not afford an explanation of the spiritual world. The finite mind cannot comprehend the Infinite, but it may apprehend it by accepting revealed truth.

On the other hand, whereinsoever ecclesiastical dogmatism has decreed certain explanations of phenomena or conditions of the natural world, which explanations have been proved to be contrary to fact by scientific discoveries; therein such dogmas are

manifestly erroneous, and are the results of human interpretations of the text of Scripture ; which writings were inspired, not to teach man what he might find out for himself, not to instruct in natural science, but to reveal how the creature may approach the Creator.

In each case, therefore, the apologists of party have argued from the known to the unknown, and the result has been a confusion of ideas—generally, if not invariably, the result of a warped or bigoted intellect.

It is, however, only so far as we receive God's revealed truth that we can really appreciate the wonders of the natural world.

Unity in design, variety in carrying out that design, is evident throughout the whole of organic and inorganic nature.

It is not e-volution, but re-volution. All revolves in a circle : the solar system, among the ten thousands of others, coursing rapidly through space ; the earth, with its marvellous duplex motion, at once revolving on its axis (which has not only the movement which produces the seasons, but a far more complex one—the precession of the equinoxes), and also revolving round the sun, to all of which we are absolutely insensible ; organic life, in our world, the germ, growth, reproduction, decay. The theory of evolution as applied to these phenomena is far more inconceivable than that which theology presents. As touching organic life, I may quote a sentence I came across some years ago : "Supposing the cycle of life to be a spiral instead of a circle, it may ascend or descend, expand or contract ; but this does not connect it with other similar spirals, the separate origin of which is to be separately accounted for."

It is a fundamental axiom of evolutionists that organisms have gone on improving in complexity and form. The inspired record of creation states the fact, which geological scientists have only recently proved, of the successive introduction of higher forms, concluding with man. But the original families continue to-day more or less in the same conditions as when first introduced. There has been multiplication of genera, of species ; also infinite degradation and degeneration ; but no evolution in the real sense of a lower producing a higher type.

It is surprising to me that thinking men, scientific workers, who refuse to accept anything unless it be actually proven, should

dogmatize as they do about evolution. I grant that the theory is enticing, but I absolutely deny that, even by the latest discoveries, they have any grounds for stating that the theory is proven. Therefore, it is remarkable that while they demand faith from their followers in theories which are, at least, unsatisfactory—though they throw the main weight of this odium on the imperfection of the geological record—they should deny to their opponents the consolation of faith in things which are unseen and are eternal.

Is it evolution or degeneration? Evolutionists leave all to Nature, and, by demanding countless ages for Nature to work, they can throw dust in the eyes of their disciples, and ignore the unnumbered missing links necessary to substantiate their theory by simply referring to the imperfections of the geological record, on which alone they trust.

Degeneration demands merely the recognition of a law which can be seen working in our midst, starting with, at least, the same premises of leaving all to Nature.

During the historic period—a term too short for evolutionists to attend to—all the improvements in animals or plants have been owing to cultivation; the improved species, when left to themselves, rapidly returning to the original type form.

Man alone has within him a power for which no evolutionists can account, and for which only revelation can give a satisfactory reason—a power which enables him to go forward; while at the same time he has always within him the elements of degeneration, which, if not overcome, too often lower him to the condition of a mere animal, even if they do not degrade him below the brute beast whose sole thoughts are of to-day.

Life is too short, its duties are too momentous, for us to spend our few days in speculation. One thing is evident—man *has* a body, and *is* a spirit which will live for ever. Revelation tells him how to prepare for that future life.

Meanwhile there are thousands who, knowing, believing in, and loving this grand truth, can afford a few hours occasionally, in the ever-increasing struggle for existence, to devote to the study of nature. If they approach it with the feelings of the psalmist—“Lord, how manifold are Thy works! in wisdom Thou hast made

them all"—to them the study is not only of the deepest interest in itself, but, by increasing their knowledge and appreciation of the wonderfully intricate works of the great Creator, it assures them that if He can so carefully arrange the complicated adjustments which are necessary for the well-being of the whole organic world, and can watch over all the smallest organisms that He has created, so much the more they, who are formed in His image, after His likeness, are His special care. Thus, amid the thousand ills they suffer, they may, through Nature, be again led up to Nature's God, and acknowledge that He, the Omniscient, the Omnipresent, the Omnipotent, "hath done all things well."

Dr. J. C. Shairp * says, "The ground of all religion, that which makes it possible, is the relation in which the human soul stands to God. This relation is the root one, and determines what a man really is. As A Kempis says, 'What thou art in the sight of God that thou truly art.' The practical recognition of this relation as the deepest, most vital, most permanent one, as that one which embraces and regulates all others—this is religion. And each man is religious just in proportion as he does practically so recognize this bond, which binds him to his Maker." †

* "Culture and Religion in some of their Relations," pp. 14, 15.

† Senhor Arthur Vianna de Lima, son of H. E. the Baron de Iaurú, Brazilian Minister at Berlin, has just (December, 1885) published a work entitled, "Exposé sommaire des théories transformistes de Lamarck, Darwin, et Hæckel." The *Morning Post*, in a lengthy telegram from its correspondent in Vienna, dated December 7, concludes thus: "M. Lima's book is destined to create a sensation in literary and scientific circles, and will powerfully contribute to throw ridicule on a modern school of philosophers, who have done very little towards the perfection of man and the progress of science."

It is much to be regretted that the *Morning Post*, a distinctly religious paper, should have inserted such unqualified praise of a book which is evidently written by an avowed Atheist. I feel compelled, therefore, to give one or two extracts, which will at once show the tendency of the work.

After most violent vituperation against the credibility of Holy Scripture, and a blasphemous allusion to our blessed Lord, "one of the sons of Mary" (p. 275), the author proceeds (p. 276): "The constant observation of nature leads to this necessary conclusion, and the only true one—the eternity of matter in motion." He considers he has then settled the matter, and sees no difficulty in the illogical statement that follows (p. 278): if we allow "Creation, it is necessary to suppose that it is the work of an Almighty workman (*artisan tout puissant*), we must then ask, 'Who, then, was the father of God?' As to admitting that the Creator Himself had no beginning, that He existed uncreate

PROTECTIVE COLOURING AND MIMICRY.

I should like to have been able to give a lengthy note on this most interesting subject, but had very few opportunities of studying even the cases which came under my notice.

Among the more conspicuous instances of protective colouring I may mention the genus *Ageronia* of butterflies. These invariably rest, head downwards, with their wings fully expanded, and flattened out on the lichen-covered trunks of the lofty palm trees. These butterflies are plentiful at Rio de Janeiro, and, though a large insect—some two inches across the wings—may yet be passed unnoticed at the distance of a few yards, so closely do they simulate the lichens.

The genus *Siderone* is also noteworthy. They always rest, with wings folded over their bodies, on branchlets; the markings and colouring of the under side of the wings resembling exactly dry brown or yellow leaves. The species *S. Isidora* (Cram.) has also two clear spots on the upper wings, mimicking holes made by insects.

Referring to the mimicry of moths, Mr. Bates says,* "Several times I shot by mistake a humming-bird hawk-moth instead of a bird." "Along the narrow paths in the forests an immense number of clear-winged moths are found in the daytime, mostly coloured like wasps, bees, ichneumon flies, and other hymenopterous insects. Some species of the same family have opaque wings, and wear the livery of different species of beetles; these hold their wings in repose, in a closed position over their bodies, so that they look like the wing-cases of the beetles they deceptively imitate."†

from all eternity, it would be a superfluous hypothesis. . . . It is, then, much more simple and much more natural to suppose that the universe has always existed, that the unlimited material which composes it has always been in motion, that it has ever eternally metamorphosed itself." On reading this, one thought is borne on the mind, that word "God shall send them strong delusion, that they should believe a lie" (2 Thess. ii. 11). Domine dirige nos in viam veritatis.

This note, with the exception of the last sentence, was inserted in the *Morning Post*, January 6, 1886.

* "The Naturalist on the River Amazons," vol. i. pp. 181, 105.

† Mr. Thomas Belt, in "The Naturalist in Nicaragua," gives instances of

The axiom that the mimicking insect should be rarer than its model is not always carried out, *e.g.* the *Euterpe tereas* (Pierinæ), which copies the *Papilio nephalion*. It is often common while the latter is rare. The *Colanix Julia* (Nymphaliniæ) is far commoner than the deceptively similar but smaller *Euclides aliphæra* (Heliconiniæ).*

I must next refer to the sub-families Danaïniæ and Heliconiniæ, in which mimicry among various genera is the more remarkable, as it is not, apparently, necessary for protective purposes. Dr. Fritz Müller remarks† that “the Ithomiæ of the Amazons and their allies, *e.g.* *Mechanitis*, as Bates observes, are imitated by so many butterflies belonging to the most different families, that they may certainly be correctly regarded as quite safe from the pursuit of birds on account of their distastefulness. . . . Among the numerous mimics are swarms of *Acraea thalia*. The strong-smelling *Euclides Isabella* and *Heliconius eucrate* have either individually or together acquired a resemblance to *Mechanitis lysimnia*, which insect to us is inodorous; and amongst the numerous butterflies which sufficiently resemble the three above-named species as to be occasionally mistaken for them are species belonging to the Ithomia group (*Melinæa*), and to the true Danaïdes (*Lycorea*). *Thyridia* and *Ituna* (Danaïdæ) both belong to the class of cases in which the two species which resemble one another appear to be equally well protected by distastefulness. The former belongs to the Ithomia group, the distastefulness of which has been referred to; and the latter to the Danaïdes, which play the same part as models of imitating species in the Old World as the Ithomiæ in the New. They appear even after death to defy the ravages of time and the attacks of mites, etc., by virtue of their distastefulness.”

Mr. Bates, in discussing this paper, said, “The numerous cases where species which are themselves apparently protected by their offensive secretions, evidently mimic other species similarly protected, still form a great stumbling-block; the excessive complexity

stinging ants being closely copied in form and movement by spiders, Hemiptera and Coleoptera. I have an example in the genus *Mutilla*, which is exactly imitated by the beetle *Cyphus Linnæi*, Sch.

* “Proc. Ent. Soc.,” 1879, p. xx., etc.

† *Ibid.*, p. xxv., *et seq.*

of the question is evident to all who read Dr. Fritz Müller's writings on the subject. . . . The phenomena with regard to the Heliconidæ are these: In tropical South America a numerous series of gaily coloured butterflies and moths, of very different families, which occur in abundance in almost every locality a naturalist may visit, are found to change their lines and markings together, as if by the touch of an enchanter's wand, at every few hundred miles, the distance being shorter near the eastern slopes of the Andes than nearer the Atlantic. So close is the accord of some half-dozen species (of widely different genera) in each change, that he [Mr. Bates] had seen them in large collections classed and named respectively as one species."

Ituna and *Lycorea* are connecting links between the Danaïdes and the Ithomiæ.

Among the beetles (*Coleoptera*), I may mention the genus *Chlamys*, of which Mr. Bates says,* it consists "of small beetles of a cubical shape and grotesque appearance, the upper surface of their bodies being studded with tubercles. They look like anything rather than insects; some of them are an exact imitation of the pellets of excreta of caterpillars on leaves" (e.g. *Chlamys Nattereri*,† Kollar; † *C. arcula*,† Germ., etc.). "Others have a deceptive likeness to small flower-buds, galls, and other vegetable excrescences; while some large kinds are like fragments of metallic ore" (e.g. *Poropleura bacca*,‡ Kirby; *P. monstrosa*,‡ Oliv.). "They are very sluggish in their motions, and live in the most exposed situations on the surfaces of leaves. Their curious shapes are, therefore, no doubt so many disguises to protect them from the keen eyes of insectivorous birds and lizards.

"A nearly allied group, *Lamprosomas*" (of which I have several species), "have perfectly smooth convex bodies; these glitter like precious stones on the foliage, and seem to be protected by the excessive hardness of their integuments. . . .

"The *Chlamydes* are almost confined to the warmer parts of America, and the species, although extremely numerous (about three hundred are known in collections), are nearly all very rare.

"It is worthy of note that mimicking insects are very generally

* "The Naturalist on the River Amazons," vol. i. pp. 346, 347.

† Collected by me in Minas Geraes and ‡ near Rio de Janeiro.

of great scarcity ; that is, few examples of each species occur in the places where they are found, and they constitute groups which are remarkable for the strongly marked diversity and limited ranges of their species."

I took a beautiful weevil—*Heilipus trachypterus* (Germ.)—in Minas, whose cream-coloured and black elytra, studded with rugosities or tubercles, resemble the lichens of the tree trunks. I also found some sand-beetles, which were protectively coloured.

Many other beetles, which would not be considered to be thus guarded against their foes, are found to be so in their native haunts, from resembling either a black dead leaf or a berry, etc.

I may also mention the grasshoppers. Some long and thin, exactly simulating blades of grass ; others larger, some two inches long by half an inch thick. One specimen that I have is *Steirodon citrifolium* (Serv.). These are exactly similar to green leaves.

There is also the curious group of Phasmidæ, or stick-insects.

For further details I would refer to Mr. A. R. Wallace's book, "Tropical Nature ;" also to a very interesting essay on "Protective Resemblances and Mimicry in Insects," by Roland Trimen, F.R.S., in the February and March numbers of the *Entomologist* for 1885 ; also a paper on "The Habits of the Butterflies of the Amazon Valley," by A. R. Wallace.*

There is no doubt that insects are endowed with protective colouring and mimicry to assist those which are edible in avoiding their innumerable foes, while the gaudily coloured genera may freely display themselves, as, being unpalatable, they have no need of concealment.

The theory of these phenomena has been so frequently discussed that I must do no more than allude to the subject ; but I am compelled to confess that I cannot agree with the hypothesis of the gradual development of such protection ; not only because I fail to comprehend how, during the necessarily lengthened period when such an advantageous condition was being produced, the individuals could derive any benefit, but also especially on account of the dangerous deductions that have been drawn from the theory of evolution.

It is unnecessary to detail all the *pro* and *con* arguments which

* "Trans. Entom. Soc.," 1853.

have been adduced almost *ad nauseam*; but I earnestly recommend all students to examine the theories of natural selection and survival of the fittest, together with the extravagant demands of their exponents, and to consider whether the opposing theory of special creation may not, at least, be as tenable and workable.

How can men believe in, or even consider as possible, the calmly propounded theories of evolutionists who have gone beyond Darwin, and who present, as their well-weighed conclusions, the statement that every existing organism has evolved by chance from one primordial germ, and that the first particle of animated matter was "the fortuitous concourse of atoms"?

At least, the yawning and insuperable gulfs which exist between certain families cannot, to my mind, be bridged over by any theory but the axiom of special creations, at certain periods, however remote.

Mr. Darwin has said,* "It is those who know little, and not those who know much, who so positively assert that this or that problem will never be solved by Nature."

Therefore I plead again for moderation in the expression of ideas, both from scientists and theologians. But I contend that, at least, we must start with the fundamental doctrine of a Supreme Being, Who is, by infinite condescension, in personal relation to every one, and Who, while He makes wonderful revelations of His power and omnipresence in the natural world—every movement of which is the object of His care—reveals Himself in a far more transcendent and miraculous manner to man, who is conformed to His likeness, and "in Him we live, and move, and have our being."

I conclude with an extract from Professor P. J. van Beneden's work on "Animal Parasites":—

"All the mutual adaptations are pre-arranged, and, as far as we are concerned, we cannot divest ourselves of the idea that the earth has been prepared successively for plants, animals, and man. When the Creator first elaborated matter, He had evidently *that* being in view who was intended at some future day to raise his thoughts to Him and do Him homage. . . . The artist who tempers the clay from which to make his model has already conceived in his mind the statue which he is about to produce.

* "Descent of Man," vol. i. p. 3.

Thus it is with the Supreme Artist. His plan for all eternity is present to His thought ; He will execute the work in one day, or in a thousand ages. Time is nothing to Him ; the work is conceived, it is created, and each of its parts is only the realization of the creative thought and its pre-determined development in time and space. 'The more we advance in the study of nature,' says Oswald Heer,* 'the more profound also is our conviction that belief in an Almighty Creator and a Divine wisdom, Who has created the heavens and the earth according to an eternal and pre-conceived plan, can alone solve the enigmas of nature, as well as those of human life. Let us still erect statues to men who have been useful to their fellow-creatures, and have distinguished themselves by their genius ; but let us not forget what we owe to Him Who has placed marvels in each grain of sand, a world in every drop of water.'"

LIST OF BEETLES (*Coloptera*)

collected by me in Brazil. All the insects were taken in the province of Minas, except those marked *, which came from the province of Rio de Janeiro and the neighbourhood.

The nomenclature is from specimens in the collection of the British Museum, at the Natural History Museum, South Kensington, London.

The classification is from the "Histoire Naturelle des Insects, Genera des Coléoptères" . . . par M. Th. Lacordaire, Paris, 1854. Twelve vols. I have also carefully examined the "Catalogus Coleopterorum," by Dr. Gemminger and B. de Harold, Munich, 1869-1876.

Order.—COLEOPTERA.

Family—CICINDELIDÆ.
Sub-fam. *Megacephalida*, *Lac.*
Oxycheila, *Dej.*
tristis,* *Fabr.*

Fam.—CARABIDÆ.
Sub-fam. *Lebiida*, *Lac.*
Calleida, *Dej.*
decora (?) *Fabr.*

Cymindis, *Latr.*
sp.
Lebia, *Latr.*
bifasciata, *Dej.*

Sub-fam. *Scaritida*, *Lac.*
Scarites, *Fabr.*
rugicollis, *Dej.*
corvinus, *Dej.*

* "Le Monde Primitif, 1876."

Sub-fam. *Stomida*.

Pelecium, *Kirby*.
cyanipes, *Kirby*.

Sub-fam. *Cratocerida*.

Melanotus, *Dej*.
impressifrons, *Dej*.

Sub-fam. *Harpalida*.

Harpalus, *Latr*.
fulgens, *Dej*.
amethystinus, *Dej*.

Sub-fam. *Feronida*.

Marsyas, *Putzeys*.
æneus, *Putz*.

Fam.—STAPHILININÆ.

Sub-fam. *Staphilinide*.

Staphilinus, *Linn*.
 sp.
Philonthus, *Curtis*.
amœnus, *Gutr*.

Fam.—HISTERINÆ.

Sub-fam. *Histerida*.

Saprinus, *Erichs*.
 sp.

Fam.—NITIDULAIRES.

Sub-fam. *Cychramida*.

Camptodes, *Erichs*.
 two species undetermined.

Fam.—TROGOSITAIRES.

Sub-fam. *Trogositida*.

Trogosita, *Oliv*.
fulgidivittata, *Blanch*.

Sub-fam. *Cucujida*.

Catogenus, *Westw*.
castaneus, *Perty*.

Fam.—DERMESTINÆ.

Dermestes, *Linn*.
 sp.

Fam.—PECTINICORNES.

Sub-fam. *Passalida*.

Passalus, *Fabr*.
furcillabris, *Esch*.
striatopunctatus, *Perch*.

Fam.—LAMELLICORNES.

Sub-fam. *Coprida*.

Gymnopleurus, *Illig*.
Mac Leayi (?), *Reiche*.
Canthon, *Hoffmannsegg*.
fasciatus, *Mann*.
virens, *Sturm*.
 three species undetermined.

Coptorhina, *Hope*.
deplanatus, *Reiche*.

Chæridium (?), *Serr*.

sp.

Canthidium, *Erichs*.

decoratum *Perty*.
atro-cœruleum (?), *Reiche*.
viridi-obscurum (?).

Copris, *Geoff*.

bos, *Lac*.

agenor, *Dej*.

bituberculata, *Klug*.

Æneas, *Reiche*.

crnicollis, *Germ*.

sp.

Pinotus, *Erichs*.

Eridanus, *Oliv*.

Phanæus, *Mac Leay*.

principalis, *Duf*.

mimas, *Fab*.

floriger, *Kirby*.

splendidulus, *Fab*.

Kirbyi, *Vigors*.

Dendropemon, *Perty*.

sp.

Onthophagus, *Latr*.

sp.

Sub-fam. *Aphodiida*.

Aphodius, *Illig*.

sp.

Atænius (?), *Harold*.

sp.

Sub-fam. *Hybosoridae*.

Coelodes, *Westw.*
gibbus, *Perty.*
castaneus.

Sub-fam. *Geotrupidae*.

Athyreus, *Mac Leay.*
parvulus, *Reiche.*
Bolboceras, *Kirby.*
striato-punctatus, *Casteln.*

Sub-fam. *Trogidae*.

Trox, *Fabr.*
sp.

Sub-fam. *Melolonthidae*.

Astæna, *Erichs.*
sp.
Athlia, *Erichs.*
sp.
Macroductylus, *Latr.*
suturalis, *Mannerh.*
affinis, *Casteln.*
angustatus, *Beauv.*
angustatus, var. *lineatocollis*,
Chev.
pilivittatus, *Reiche.*
three species undetermined.
Isonychus, *Mannerh.*
albicinctus, *Mannerh.*
sp.
Dicrania, *Serv.*
sp.
Ceraspis, *Serv.*
maculosa, *Waterh.*
two species undetermined.
Plectris, *Serv.*
sp.
Hadrocerus, *Guérin.*
castanei-pennis, *Guér.*
Liogenys, *Guér.*
sp.
several other obscure species.

Sub-fam. *Rutelidae*.

Antichira, *Esch.*
pantochloris, *Blanch.*
dichroa, *Mann.*

Antichira thoracica, *Mann.*

Cnemida (?), *Kirby.*
sp.

Rutela, *Latr.*

lineola, *linn.*

Pelidnota, *Mac Leay.*

prasina, *Burm.*

sumptuosa, *Vigors.*

lucida, *Burm.*

punctulata, *Chev.*

Plusiotis, *Burm.*

auripes, *Gray.*

Bolax, *Fischer.*

flavolineatus, *Mannerh.*

Leucothyreus, *Mac Leay.*

mutabilis, *Burm.*

Sub-fam. *Dynastidae*.

Cyclocephala, *Latr.*

sanguinicollis, *Burm.*

melanocephala, *Fabr.*

Erioscelis, *Burm.*

striata.

Stenocrates, *Burm.*

humilis, *Burm.*

Bothynus, *Hope.*

Ascanius, *Kirby.*

Deiphobus, *Burm.*

sp.

Scaptophilus, *Burm.*

cœnobata, *Dej.*

sp.

Corynoscelis, *Burm.*

glaucon, *Perty.*

Acerus, *Burm.*

sp.

Megacerus, *Hope.*

sp.

Cœlosis, *Hope.*

biloba, *Linn.*

bicornis, *Fabr.*

sylvanus, *Fabr.*

Heterogomphus, *Burm.*

Thoas, *Dej.*

two species undetermined.

Enema, *Hope.*

infundibulum, *Burm.*

Pan, *Fabr.*

- Strategus, Hope.*
Antæus, Fabr.
 sp.
Megalosoma, Burm.
Typhon, Oliv.*
Agaocephala, Serv.
cornigera, Mannerh.
Phileurus, Latr.
didymus, Linn.
 two species undetermined.
- Sub-fam. *Cetonidæ.*
Cotinis, Burm.
mutabilis, G. and P.
Gymnetis, Mac Leay.
undulata, Vigers.
reticulata, Kirby.
albiventris, G. and P.
pantherina, Burm.
hieroglyphica, Vigers.
Euphoria, Burm.
lurida, Fabr.
- Fam.—*BUPRESTIDÆ, Marsenl.*
 Sub-fam. *Chalcophoridae.*
Euchroma, Solier.
gigantea, Linn.
Psiloptera, Solier.
attenuata, Fabr.
inconstabilis, Perty.
dives, Germ.
- Sub-fam. *Buprestidæ genuinæ.*
Conognatha, Esch.
princeps, Gory.
pretiosissima, Chev.
Geralius, Harold.
mucorius, Klug.
Agrilus, Steph.
tuberculatus, Klug.
 several species undetermined.
- Fam.—*ELATERIDÆ.*
 Sub-fam. *Chalcolepidiida.*
Chalcolepidius, Eschs.
zonatus, Eschs.
Semiotus, Eschs.
ligneus, Linn.*
- Sub-fam. *Elateridæ genuinæ.*
Cyathodera, Blanch.
longicornis, Blanch.
Monocrepidius, Eschs.
stigmatus, Cand.
 three species undetermined.
- Fam.—*MALACODERMES, Kiesenw.*
 Sub-fam. *Lycidæ.*
Calopteron, Guérin.
 sp.
Blessenus,
Lacordairei, Kirsch.
- Sub-fam. *Lampyridæ.*
Lucidota, Casteln.
lampyris.
 sp.
Photinus, Cast.
 sp.
Aspidosoma, Cast.
pallidum, Oliv.
Lampyris (?).
 sp.
- Sub-fam. *Telephoridae.*
Chauliognathus, Hentz.
 sp.
Telephorus, Schöff.
axillaris, Fisch.
 three species undetermined.
Pyrophorus,
noctilucus, Linn.
ocellatus, Germ.
candelarius, Germ.
 sp.
- Fam.—*BOSTRYCHIDÆ.*
Bostrychus, Geoff.
equalis, Waterh.
inequalis, Dej.
 three species undetermined.
- Fam.—*TENEBRIONIDÆ, Kratz.*
 Sub-fam. *Epitragide.*
Epitragus, Latr.
fuscus, Latr.
 sp.

Sub-fam. *Zopherida*.

Nosoderma.

two species undetermined.

Sub-fam. *Tenebrionida* *Genuina*.Nycobates, *Gutr.*maxima, *Germ.*Zophobas, *Blanch.*laticollis, *Reiche.*

tridentata.

two species undetermined.

Sub-fam. *Cnodalonida*.Camaria, *Serv.*elongata, *Dej.*sp. (*Brit. Mus.*).Sub-fam. *Helopida*.Sphærotus, *Kirby.*curvipes, *Kirby.*Sub-fam. *Strongiliida*.Dicyrtus, *Lac.*binodosus, *Lac.*

Pœcilesthus.

sp.

Stenochia, *Leconte.*

two species undetermined.

Fam.—*CISTELIDÆ*.Allecula, *Fab.*patruilis, *St.*Cistela, *Fab.*

sp.

Prostenus, *Latr.*violaceipennis, *Dej.*

sp.

Fam.—*NILIONIDÆ*.Nilio, *Latr.*

two species undetermined.

Fam.—*MELANDRYIDÆ*, *Muls.*Orchesia, *Latr.*

sp.

Fam.—*LAGRIIDÆ*.Statira, *Serv.*

sp.

Fam.—*MELOIDÆ*.Sub-fam. *Cantharida*, *Lec.*Lytta, *Fabr.*punctata, *Germ.*

four species undetermined.

Fam.—*CURCULIONIDÆ*.Sub-fam. *Brachyderida*.Naupactus, *Schönherr.*vittatus, *Mannerh.*rivulosus, *Fabr.*scintillans, *Bohem.*bellus, *Bohem.*sp., *Dupont.*

two species undetermined.

Cyphus, *Germ.*Gibber, * *Pall.*argillaceus, *S.*nigropunctatus, * *Dej.*Germari, * *Sch.*augustus, * *Illig.*Hancocki, * *Kirby.*gloriandus, *S.*Platyomus, *Schönh.*tuberosus, * *J.*niveus, *Fabr.*

two species undetermined.

Eustales, *Germ.*adamantinus, *Germ.*Thurnbergi, *Dalm.*ambitosus, *Bohem.*Sub-fam. *Otiorkynchida*.Hyphantus, *Germ.*

sp.

Pycnoderes (?), *Schönh.*

sp.

Sub-fam. *Leptopsida*.Entyus, *Schönh.*auricinctus, *Germ.*Lordops, *Schönh.*Gyllenhalli, *Dalm.*Hypsonotus, *Germ.*Faldermanni, *Sahlb.*Rhigus, *Germ.*irroratus, *Bohem.*

- Entimus, *Schön.*
splendidus, * *Fabr.*
imperialis, * *Forster.*
nobilis, * *Oliv.*
- Sub-fam. *Molytidae.*
Anchomus, *Schönh.*
sp.
- Sub-fam. *Cleonidae.*
Lixus, *Fabr.*
obliquatus, *Deyr.*
bicaudatus, *Dej.*
sp.
- Sub-fam. *Hylotiidae.*
Heilipus, *Germ.*
maculosus, *Bohem.*
Freyreissii, *Bohem.*
trachypterus, *Germ.*
naevulus, *Mannerh.*
fallax, *Bohem.*
strator (?), *Bohem.*
- Sub-fam. *Rhinomaceridae.*
Rhynchites, *Herbst.*
sp.
- Sub-fam. *Cholidae.*
Dionychus, *Germ.*
parallelogrammus, *Germ.*
- Sub-fam. *Cryptorhynchidae.*
Collabismus, *Schönh.*
clitellæ, *Bohem.*
Cryptorhynchus, *Illig.*
sp.
several species undetermined.
- Sub-fam. *Zygopidae.*
Cratosomus, *Schönh.*
lentiginosus (?), *Germ.*
flavofasciatus, *Guer.*
- Sub-fam. *Baridiidae.*
Diorysomerus, *Schönh.*
auritus, *Bohem.*
altus, *Germ.*
- Diorysomerus bicolor, *Chev.*
Pradierii, var.
- Barycerus, *Schön.*
collaris, *Gylh.*
- Baridius, *Schön.*
metallescens, *Bohem.*
two species undetermined.
- Centrinus, *Schön.*
sp.
- Cylindrocercus, *Schön.*
azureus, *Bohem.*
- Sub-fam. *Calandridae.*
Rhyncophorus, *Herbst.*
Palmarum, *Linn.*
Sphenophorus, *Schön.*
crenatus, *Sch.*
two species undetermined.
- Fam.—LONGICORNES.
- Sub-fam. *Prionidae.*
Parandra, *Latr.*
mandibularis, *Perty.*
Ctenoscelis, *Serv.*
acanthopus, *Germ.*
Navosoma, *Blanch.*
triste, *Blanch.*
- Sub-fam. *Cerambycidae.*
Achryson, *Serv.*
signatipenne, *Dej.*
two species undetermined.
- Hammaticherus, *Dej.*
Batus, *Linn.*
sp.
- Criodion, *Serv.*
corvinum, *Germ.*
sp.
- Xestia, *Serv.*
confusa, *Dej.*
- Chlorida, *Serv.*
festiva, *Linn.*
costata, *Serv.*
- Eburia, *Serv.*
didyma, *Oliv.*
sp.
- Elaphidion (?), *Serv.*
two species undetermined.

- Sphæron*, *Serv.*
 sp.
Mallocera, *Serv.*
 sp.
Ibidion, *Serv.*
bivulneratum, *Thoms.*
 sp.
Compsocerus, *Serv.*
jucundus, *Dej.*
Stenygra, *Serv.*
conspicua, *Perty.*
Lophonocerus, *Serv.*
hirticornis, *Gyllh.* var., *Brit.*
Mus.
Dorcacerus, *Latr.*
auricomus, *Germ.*
auricomus var.
Trachyderes, *Dalm.*
succinctus, *Linn.*
Solieri (?), *Dej.*
lineolatus, var.
Megaderus, *Serv.*
stigma, *Linn.*
- Sub-fam. *Lamiidæ*.
Pteroplius, *Serv.*
nodifer, *Serv.*
Oncoderes, *Serv.*
basalis.
Acrocinus, *Illig.*
longimanus, * *Linn.*
Steirastoma, *Serv.*
depressum, *Linn.*
lacerta, * *Cast.*
Acanthoderes.
 five species undetermined.
 Three Longicorns, genera and
 species undetermined.
- Fam. — PHYTOPHAGA.
- Sub-fam. *Crioceridæ*.
Lema, *Fabr.*
fasciata, *Germ.*
quadricolor, *Lac.*
- Sub-fam. *Megalopidæ*.
Agathomerus, *Lac.*
sellatus, *Germ.*
- Sub-fam. *Clytridæ*.
Megalostomis, *Lac.*
gigas, *Lac.*
obesa, *Lac.*
grandis, *Försb.*
Euryscopa, *Lac.*
terrebellum, *Lac.*
Tellena, *Lac.*
varians, *Lac.*
Pnesthes, *Lac.*
instabilis, *Lac.*
Dachrys, *Lac.*
cruciata, *Lac.*
Stereoma, *Lac.*
concolor, *Lac.*
angularis, var.
 sp.
- Sub-fam. *Cryptocephalidæ*, *Suff.*
Scholochrus, *Suffrian.*
prætextatus, *Suff.*
Metallactus, *Suff.*
decumanus, *Suff.*
- Sub-fam. *Chlamidæ*, *Lac.*
Chlamys, *Knoch.*
Nattereri, *Kollar.*
flaveola, *Dej.*
arcula (?), *Germ.*
Poropleura, *Lac.*
monstrosa, * *Oliv.*
bacca, * *Kby.*
- Sub-fam. *Lamprosomidæ*, *Lac.*
Lamprosoma, *Kby.*
chamæleon, *Lac.*
cœruleum, *Lac.*
smaragdinum, *Lac.*
lepidum, *Lac.*
- Sub-fam. *Eumolpidæ*.
Metaxyonycha, *Marshall.*
suturalis, *Dej.*
Colaspis, *Fabr.*
trivialis, *Boh.*
prasina, *Dej.*
crenata, *Fabr.*
assimilis, *Dej.*

- Colaspis smaragdina*, *St.*
cupripennis, *Dej.*
violacea, *Dej.*
 About ten undetermined sp.
Chalcophana, *Chev.*
aurata, *Oliv.*
viridipennis, *Germ.*
ruficrus, *Germ.*
 sp.
Cychræa, *Baly.*
cerasina, *Pery.*
livida, *Dej.*
 sp.
Eumolpus, *Weber.*
nitidus, *Fabr.*
ignitus, *Fabr.*
Typophorus, *Erichson.*
sanguinicollis, *Dej.*
Endocephalus, *Chapuis.*
bigatus, *Germ.*
10-maculatus, *Germ.*
sex-lineatus, *Chev.*
Colaspoides, *Cast.*
cyanella, *Dej.*
blanda, *Dej.*
 Sub-fam. *Chrysomelide.*
Phædon, *Latr.*
pertinax, *Stål.*
Calligrapha, *Erichs.*
polyspila, *Germ.*
Zygogramma, *Chev.*
fulvocincta, *Stål.*
rivulosa, *Stål.*
Deuterocampta, *Erichs.*
mutabilis, *Stål.*
Doryphora, *Ill.*
reticulata, *Stål.*
aurantiaco-maculata, *Blanch.*
cincta, *Germ.*
Fairmairei, *Stål.*
 sp.
Strichosa (?), *Chev.*
 sp.
 Sub-fam. *Galerucide.*
Cacoscelis, *Chev.*
famelica, *Clark.*
- Cacoscells Feldneri*, *Ill.*
 sp.
Disonycha, *Chev.*
lineata, *Dej.*
 sp.
Omophoita, *Chev.*
sex-guttata, *Ill.*
argus, *Chev.*
sex-notata, *Dej.*
transversa, *Germ.*
angulo-notata, *Clk.*
submaculata, *Clk.*
episcopalis, *Ill.*
quatuorfasciata, *Chev.*
dicipiens, *Clk.*
Edionychus, *Latr.*
5-punctatus, *Chev.*
opimus, *Germ.*
circumcinctus, *Dej.*
humeralis, *Ill.*
pallidipennis, *Clk.*
cruciger, *Clk.*
libenturus, *Germ.*
areatus, *Germ.*
quadrifasciatus, *Reiche.*
tricruciatu, *Germ.*
 sp.
 Sub-fam. *Hispide.*
Uroplata, *Baly.*
 three species undetermined.
Alurnus, *Fabr.*
nigripes, *Guér.*
 Sub-fam. *Cassidide.*
Calyptocephala, *Boh.*
nigricornis, *Germ.*
Desmonota, *Hope.*
variolosa, *Fabr.*
cariosa, *Boh.*
Canistra, *Erichs.*
rubiginosa, *Guér.*
Batonota, *Hope.*
monoceras, *Germ.*
illudens, *Bohem.*
Coptocycla, *Boh.*
elator, *Klug.*
 two sp. undetermined.

Mesomphalia, *Hope*.
conspersa, *Germ.*
subreticulata, *Boh.*
contubernalis, *Boh.*
sp.

Pœcilaspis, *Hope*.
sp.

Omoplatea, *Hope*.
aulica, *Dej.*

Omoplatea dichroa, *Germ.*
generosa, *Boh.*
sp.

Selenis, *Hope*.
spirifex, *Linn.*

Fam.—COCCINELLIDÆ.
 Several undetermined species.

271 species determined.

131 species undetermined.

Total 402 species, besides twenty or thirty obscure species.

NOTES ON A FEW OF THE ABOVE COLEOPTERA.

It is extremely difficult, among many interesting groups, to select a few for special notice; but I may mention the fireflies (*Lampyridæ* and *Telephoridæ*), and the genus *Lytta* (*Cantharidæ*), which are used medicinally. "The genus *Cyphus*, peculiar to South America, is one of the finest of the family; some of the species, *e.g.* *Hancocki*, are the largest and most magnificent of known *Curculionidæ*." *

"Four splendid species constitute the genus *Entimus*; they are *imperialis*, Fors., *splendidus*, Fabr., *nobilis*, Oliv., from Brazil, and *granulatus*, Linn., from Cayenne. They have been known for a long time, and are more or less common in collections. With the exception of *splendidus*, which is adorned by patches—partly confluent, of a brilliant coppery green, all are uniformly covered with scales of a beautiful golden green. They are peculiar to South America, and are generally found together in more or less numerous bands. I have several times seen, in Brazil, mimosas loaded with specimens of *imperialis*, so that their branches bent under the weight." †

The beautiful little metallic blue beetle, *Compsocerus jucundus*, Dej., is worth mentioning, as it has curious black hairy tufts in the middle of its delicate long antennæ. Mr. Bates ‡ refers to another Longicorn, *Coremia hirtipes*, which has a tuft of hair on its hind legs, and remarks, "It suggests curious reflections when we see an ornament like the feather of a grenadier's cap situated on one

* Lac. vi. 115.

† Ibid., 283.

‡ Vol. i. p. 209.

part of the body in one species, and in a totally different part in nearly allied ones. I tried in vain to discover the use of these curious brush-like decorations."

I have already referred to the genera *Chlamys* and *Poropleura* in my article on Mimicry. I may add under that head the genus *Batonota*, which, like some of the Homoptera, resemble thorns.

One other Brazilian beetle peculiar to Minas Geraes, to which I must refer, is *Hypocephalus armatus*, Desm. The Rev. Hamlet Clark,* in a letter from Constantia, Organ Mountains, in 1856, writes: "Only three examples, I believe, are known of *H. armatus*, or Anglice, the mole-cricket beetle, from its quaint resemblance to a mole-cricket. Well, I had some drawings of this creature made from the figure Mr. Smith gave me, and distributed them among some lively-looking slaves here, with the promise of three milreis (about six or seven shillings) for every specimen they would bring me. But these negroes have such exuberant imaginations! Yes, they all had seen it, had seen it often, knew it *well*, one had found it under rotten wood, another had seen it frequently in his plantation, a third had seen it in the path only the other day; but all this is only talk (three milreis would be a fortune to any of them), and no *Hypocephalus* has ever made its appearance." M. Desmarest says,† "It is a most anomalous beetle of large size, from the province of the mines in the interior of Brazil, whose natural relations have perplexed all subsequent entomologists." Mr. J. O. Westwood remarks, "The insect exhibits, as M. Desmarest well observes, a certain analogy with the mole-cricket in the large size of the prothorax, thick hind legs, and short antennæ." The length of Mr. Westwood's specimen was three inches and half a line long; he believed that this one was then (1845) the only one existing in metropolitan cabinets. M. Desmarest's specimen was two inches and one-fifth long; while that described by Gistel was two inches and one-twelfth long. Mr. Westwood mentions that a specimen was bought for the Paris Museum of Natural History at the price of 700 francs. Professor Burmeister considers "the curious animal *Hypocephalus*" to be a Longicorn of

* "Letters Home," p. 141. London, 1867.

† "Guérin's Magazin de Zoologie," 1832, vol. i. p. 24.

‡ "Arcana Entomologica," vol. i. p. 35. London, 1845.

the sub-family Prionidæ. My friend, Mr. Melvill, lately (1885) bought a specimen from Mr. Janson, of Little Russell Street, who wrote to him as follows: "Two specimens were received from Signor de Laenda, of Bahia, who obtained them from the interior: one of these, the smaller, I sold to M. van de Poll, of Amsterdam, in July last (1885); the other, now sent to you, I had intended keeping, as, beyond a specimen in the British Museum and one in Mr. Alexander Fry's collection, there are, I believe, no others in London, or probably in this country." Mr. C. O. Waterhouse of the British Museum has confirmed this statement.

The "Catalogus Coleopterorum" gives the names of over 73,000 species of beetles; the Curculionidæ and Chrysomelidæ being each represented by over 10,000 species, the Geodephaga and Lamellicornes by 8000 each, and Longicornes by 7500.

NOTES ON OTHER INSECTS.

In the foregoing notes on insects, I have placed Lepidoptera in the first place, because butterflies are certainly the best known and the most favoured, on account of their displaying themselves everywhere and their vivid colouring. In reality, the highest order of insects is Hymenoptera,* then follow Coleoptera, which are succeeded by Lepidoptera. I shall now refer to the Hymenoptera, and then proceed with the other orders in their proper sequence

HYMENOPTERA.

Bees and Wasps.—I have frequently alluded to the honey-bees and wasps in my journal, and as I did not collect them (though I have about a dozen species), I think it unnecessary to say more than a word about them. On one occasion, in the spring (September 3, 1883), we came across a very neatly shaped wasps' nest in a tree, and, wishing to preserve it, I had the insects driven out, carried off the nest, and placed it in another tree some hundred yards off. On returning in the evening, we found that the wasps had discovered their nest, and were again in possession. These

* The cerebral ganglia are more developed in ants than in any other insect. Belt's "Nicaragua," p. 28.

were stinging wasps, and their nest was made of grey paper-like material.

Later in the season (November 5), a colony of very small black bees made a nest of clay in our rancho, the entrance being through a covered way built up the log wall. Dr. Gardner* gives a lists of eighteen honey-bees, with their local names only. They mostly belong to the genus *Melipoma*, Illig. Mr. Bates† also refers at some length to bees and wasps.

Ants.—Among the many entomological specimens I collected are some pretty red-yellow-and-black hairy ants. They are *Mutilla tristis*, Klug.; *M. perspicillaris*, Klug.; *M. spinosa*, var.; and another. They are fierce and aggressive, and are exactly imitated by a rhyncophorous beetle of the genus *Cyphus* (*C. Linnæi*, Sch.).

I must devote a few more lines to an ant already referred to at some length under the native names of cabeçudo and tanajura. The abnormally hard- and large-headed workers carried off my provisions, and destroyed my flannel shirts, so I reciprocated by frying and eating the plump and toothsome females. The workers are the cabeçudo, *Atta cephalotes*, Linn., *A. sexdentata*, Latr.; the large-bodied males and females are *A. abdominalis*, Smith. The females are twice the size of the males, and over two inches across the wings. The English name is umbrella, or carrying, ant.‡ Mr. Bates calls them saüba ant, and devotes ten pages to an account of their habits; he gives figures of the workers and females. I have repeatedly seen armies of the workers ascend a tree and strip off every leaf; these fall to the ground, and are then cut up into convenient sizes, and carried off by another legion to the nest. I was told that the ants form underground mushroom-beds, and feed their larvæ with the fungi that grow on the decaying leaves. The ants often struggle along with a piece of leaf a dozen times larger than themselves clasped in their mandibles, and held erect and so firmly that one can lift the leaf from the ground, and yet they cannot be persuaded to leave hold. It is amusing to observe what appears like a long line of animated leaves crossing a road or moving along some fallen tree-trunk

* "Travels in Brazil," p. 248.

† "The Naturalist on the River Amazons," vol. ii. p. 40.

‡ "Insects Abroad," p. 441, Rev. J. G. Wood.

over a stream. On examination, you find two lines of ants—one army going towards the nest, each individual with its leafy burden; the other running along in the opposite direction much faster and returning to the field of their labours. Whenever an ant dropped his load on the way home, I never noticed him pick it up again; he invariably turned back and went for a fresh leaf. Thus, in some places, such as a deep wheel-rut, where many ants dropped their burdens in ascending its precipitous sides, there was quite a little heap of leaf fragments. I found that my dog was fond of catching and eating the lemon-scented workers. The nests abound everywhere in the campos, and present the spectacle of large heaps of pellets of earth, sometimes many square yards in extent and a couple of feet high. These mounds are formed of the earth excavated from their subterranean galleries, each several pellet having been moulded and carried up in the workers' jaws. I have often watched these energetic insects staggering up with their load to the entrance of their gallery, then running to the edge of the embankment, dropping their burden over the side and gaily returning to their subterranean labour.

On November 28, 1883, I found a small nest of ants on the branch of a shrub; it was spherical in shape, about one inch and a half in diameter, and composed of red micaceous earth.

NEUROPTERA.

Termites.—Of all disagreeable-looking insects, I think the soft-bodied, semi-transparent, dirty whitey-grey termite workers are at once the ugliest and the most repulsive. We, fortunately, never suffered much from their depredations, although occasionally in camp we discovered a band of them crossing the floor of our rancho, and found their covered ways, built of a thin crust of red earth up the side of the wall, constructed so as to reach unobserved the object of their attacks; but as we promptly destroyed them and their galleries, I had no opportunity of watching them indoors. Their huge conical parti-coloured nests, which are very abundant, form one of the principal features in the scenery of the highland campos. The general colour is red, but additions are often made in white or grey earth; and as the nest is frequently enlarged, at length the original hemispherical

or conical shape is lost under the numerous bosses which have been thrown out in all directions. Professor Drummond has published a very interesting article* on the "Use of the Termite in the Economy of Nature." He argues that they perform in the tropics a similar work to that which is carried out by the earth-worm in the temperate zones.

DERMAPTERA OR ORTHOPTERA.

Mr. Francis Walker states, at the end of his catalogue, that the name Dermaptera, given to these insects by De Geer, has the right of priority; they were afterwards called Orthoptera by Olivier. Respecting their geographical distribution, he says they generally are more limited to warm regions than are the other orders of insects, which also more or less precede them in time of yearly appearance. In regard to the way in which ramifications from the Dermaptera in tropical regions have converged towards the poles, some tribes appear to have left their first habitation entirely as the increasing heat and dryness deprived them of circumstances essential to their existence, and some seem to have increased in numbers and variety after their migration. The advance to the north from the equatorial regions may be included in four principal divisions; first, through China to Japan; second, from the East Indies along the Himalaya and other mountain-ranges to West Asia and to Europe; third, from Central Africa to North Africa and Europe; fourth, from Equatorial America to North America. The regions on the south of the equator from three principal divisions: first, that of South America, where insect life is most abundant; second, Australia and the numerous neighbouring islands; third, South Africa, where the insects are least numerous. Mr. Brunner de Wattenwyl, in his essay on the geographical distribution of the Blattariæ, has divided the globe into sixteen regions—nine of these are north of the equator, two are south, five are on both sides, of which South America towards the Atlantic is one. Mr. Walker gives a list of the special genera of all the Dermaptera found in each of these sixteen regions.

* *Good Words*, May, 1885.

Section I. COCKROACHES (*Blattariæ*).

I collected some thirty species of *Blattariæ*, including *Peta-sodes dominicana*, Sauss. ; *Tarraga guttiventris* ; *Proscratea conspersa*, Sauss. ; *Brachycola vittata* (?) ; *Epilampra agathina*, Sauss. ; *E. subconspersa*, Clk. ; *E. caliginosa*, Clk. ; *Pseudomops femoralis*, Clk. The names are taken from the specimens, and the authorities from the "Catalogue of the Specimens of *Blattariæ*, in the collection of the British Museum," by Francis Walker, F.L.S., 1868, from which book these notes are also extracted.

In a summary at the end of the volume, Mr. Walker says, "In this catalogue, 686 species of *Blattariæ* are recorded, and there are many yet unnamed. It is not easy to ascertain correctly their geographical distribution. Some species pass from one region to another, and multiply excessively in artificial circumstances. Other species are of rare occurrence, and the continuance of them may be partly insured by their seeming to be what they are not, or by their mimicry of various kinds of *Coleoptera* and *Phasmidæ*, and of *Myriapoda*, and of *Isopod crustacea*. . . . The fore wings are remarkable on account of their various structure. . . . The groups cannot be arranged according to their affinities in a line, or in a circular series ; in other words, several different lines or arrangements may equally well express the natural system."

Section II. LOCUSTS AND GRASSHOPPERS (*Saltatoria*).

I collected some twenty species, including, among the grasshoppers (*Gryllidæ*), *Gryllus capensis*, Linn. ; and among the locusts (*Locustidæ*), *Meroncidius varius*, Bates ; *Steirodon citrifolium*, Serv. ; *Diplophyllus mundus*, Clk. ; *Pterochroza pictifolia* ; besides undetermined species of the following genera : *Con-cephalus* ; *Phylloptera*, Serv. ; *Cephalosama*, Serv. ; *Mesops*, Burm. ; *Minorissa*, *Macrolyristes* (?) , *Caloptenus*, Burm. ; and *Stenobothrus*, Fisch. The names are taken from the specimens and the "Catalogue of the Specimens of *Dermaptera Saltatoria* in the Collection of the British Museum," by Francis Walker, F.L.S., 1868-71. That author states that the genus *Pterochroza*, with the closely allied *Cycloptera*, "excel all other *Saltatoria* in the

beauty of their wings." They are large insects, with marvellous mimicry of dry or green leaves. The *Steirodon citrifolium*, Serv., is another example of mimicry, as also the genus Phylloptera.

The Phasmidæ and Mantidæ belong to this order.

HOMOPTERA.

The following is the list of the insects of this order I collected:—

Family—STRIDULANTIA.

- Zammara.
 - tympanum, var. *Am.* and *Serv.*
- Cyclochila.
 - honesta, *Walk.*
- Fidicina.
 - picea, *Walk.*
 - mannifera, *Faber.*
 - opalina, *Am.*
 - maculipennis, *Lap.*
- Cicada.
 - compacta, *Walk.*
 - triupsilon, *Walk.*
 - sp.

Fam.—FULGORINA.

- Dyctiophora, *Germ.*
 - sp.
- Phenax.
 - variegata, *Germ.*
- Pterodictya.
 - ephemera, *Burm.* (Rio de J.)

Fam.—MEMBRACINA.

- Membracis.
 - lunata, *Fab.*
 - c-album, *Fairm.*
- Hoplophora.
 - porosa, *Walk.*

Fam.—CICADELLINA.

- Æthalion.
 - albinervosum, *Blanch.*
- Tomaspis.
 - nigricans, *Amyot.*
- Monecphora.
 - radiata, *Walk.*
 - two sp. undetermined.
- Sphenorhina.
 - marginata, *Fabr.*
 - liturata, *St. Farg.*
 - compressa, *St. Farg.*
 - four sp. undetermined.
- Tettigonia.
 - two sp. undetermined.
- Proconia.
 - sp.

The specimens were named from the collection, and the classification is taken from the "List of the Specimens of Homopterous Insects in the Collection of the British Museum" (four vols., with supplement, London, 1850-58), by Francis Walker, F.L.S.

The Cicadas are tree-feeders. Their native name is cigarros. "The males are remarkable for the loud shrill noise which they produce by means of an apparatus called the drum, which is placed in the under side of the thorax, and is covered with a

horny plate that can mostly be seen from the upper surface of the insect."* They abound in the bushes and shrubs on the campos, and their peculiar rasping note attracts attention all the more, because it is only when the insect is at rest and invisible that the sound is produced. Mr. Bates says,† "One large kind, perched high on the trees around our little haven, set up a most piercing chirp; it began with the usual harsh jarring tone of its tribe, but this gradually and rapidly became shriller, until it ended in a long and loud note resembling the steam whistle of a locomotive engine." Mr. Bates speaks of another kind near Ega, as "very handsome, having wings adorned with patches of bright green and scarlet" (probably *Zammara tympanum*). "It was very common. . . . On approaching a tree thus peopled, a number of little jets of a clear liquid would be seen squirted from aloft. I have often received the well-directed discharge full on my face; but the liquid is harmless, having a sweetish taste, and is ejected by the insect. . . . probably in self-defence, or from fear."‡

HEMIPTERA HETEROPTERA.

I collected the following in Minas Geraes. The specimens were named from the collection, and the classification is from the "Catalogue of the Specimens of Heteropterous Hemiptera in the Collection of the British Museum," by Francis Walker, F.L.S., in eight parts, London, 1867-73.

Family.—PACHYCORIDÆ.

Pachycoris.

nitens, C.H.‡

Fabricii, C.H.

sp.

Fam.—ASOPIDÆ.

Opломus.

sp.

Fam.—PHLÆIDÆ.

Chlorocoris.

complanatus, C.H.

Macropygium.

atrum, C.H.

Fam.—PENTATOMIDÆ.

Loxa.

flavicollis, C.H.

* Figuier's "Insect World," p. 732.

† Vol. ii. p. 142.

‡ Vol. ii. p. 227.

§ C.H. refers to Dallas's list of Hemiptera in the British Museum.

Proxis.
victor, *C.H.*
Euchistus.
sp.

Fam.—EDESSIDÆ.
Peromatus.
notatus, *C.H.*
Aceratodes.
cruentus, *C.H.*
three sp. undetermined.

Fam.—SPARTOCORIDÆ.
Spartocera.
fusca, *C.H.*

Fam.—NEMATOPIDÆ.
Metapodius.
latipes, *C.H.*
Pachylis.
sp.

Fam.—ACANTHOCORIDÆ.
Camptischium.
spinosum, *Serv.*
Machtima.
crucigera, *C.H.*

Fam.—LARGIDÆ.
Dysdercus
ruficollis, *Stål.*

Fam.—PYRRHOCORIDÆ.
Largus.
lineola, *Stål.*
rufipennis, *Burm.*
sp.

Fam.—PIRATIDÆ.
Pirates.
sp.

Fam.—REDUVIDÆ.
Spiniger.
limbatus, *Burm.*
Conorhinus.
porrigens.
two sp. undetermined.

Fam.—APIOMERIDÆ.
Apiomerus.
elatus, *Stål.*

Fam.—HARFACTORIDÆ.
Saica.
sp.

Fam.—GALGULIDÆ.
Galgulus.
sp.
Mononyx.
raptorius, *Fabr.*

ARACHNIDA.

Spiders.—The only curious spiders that I collected which are worthy of note are two remarkable species of the genera *Acrosoma* and *Gasteracantha*. In each instance the body is contained in a perfectly hard shell. In the case of the *Acrosoma* it is triangular and pyramidal, while in the *Gasteracantha* it is of the form of a crab's carapace. I also took several species of *Mygale* of various sizes; the largest about two inches in length of body, seven inches across the legs, the entire body and legs being covered with reddish-brown hair. Mr. Bates* refers to a similar species, and thus describes its bird-slaying habits: "I was

* Vol. i. p. 161.

attracted by a movement of the monster on a tree trunk ; it was close beneath a deep crevice in the tree, across which was stretched a dense white web. The lower part of the web was broken, and two small birds (finches) were entangled in the pieces ; they were about the size of the English siskin, and I judged the two to be male and female. One of them was quite dead, the other lay under the body of the spider, not quite dead, and was smeared with the filthy liquor or saliva exuded by the monster. I drove away the spider and took the birds, but the second one soon died. . . . Some *Mygales* are of immense size. One day I saw the children belonging to an Indian family who collected for me with one of these monsters, secured by a cord round its waist, by which they were leading it about the house as they would a dog."

THE PARASITIC TORMENTS OF BRAZIL.

The carrapato,* or bush-tick, so often referred to is a degenerate spider (*Acaridæ*, *Arachnida*). The annoyance it caused us far exceeded that from any other animal, or reptile, or insect, that we came across. Chernoviz † names three species of this tick : *Ixodes ricinus*, Latr. ; *I. plumbeus*, and *I. reticulatus*, Latr. But I found more than three species ; the smallest are the size of our harvest-bug, and the largest are about three-quarters of an inch in diameter. Captain Burton ‡ says that "the insect was called by the ancients *κροτον* and *ricinus*, on account of its resemblance to the ripe bean of the *Palma Christi*. § It is the vincucha of Paraguay, the tique of French Guiana, and the ricinus of old authors. This *Acaride*, seen under the glass, shows a head armed with a trident of teeth, serrated inwards ; the two external blades of the terebro when entering the flesh bend away, forming a triangle, with the base outwards and downwards, and rendering it difficult to remove the plague. The three pairs of short and one of long legs are all provided with sharp and strongly hooked claws. . . . In most parts of Minas and São Paulo the nuisance

* "Carra" is an Indian word in frequent use ; thus, *carapicho* = a burr, *caramujo* or *caracol* = a large snail (*Bulimus*).

† "Diccionario de medicina popular."

‡ Vol. i. p. 158.

§ Inversely in Brazil the seed of the castor-oil plant (*mamona* or *ricino*) is termed "carrapato."

is general; it seems to be in the air; every blade of grass has its colony; clusters of hundreds adhere to the twigs; myriads are found in the bush clumps. Lean and flat when growing on the leaves, the tick catches man or beast brushing by, fattens rapidly, and, at the end of a week's good living, drops off *plena cruoris*." Chernoviz states that "Carrapatos lay an enormous number of eggs, not on the bodies of the animals where they have lived, but on the ground. The young which emerge from them climb up the plants, holding on to the leaves, and wait until some animal passes." Mr. Bates mentions* that it occupied him a full hour daily to pick them off after his diurnal ramble, and continues, "When they mount to the summits of slender blades of grass, or the tips of leaves, they hold on by their fore legs only, the other three pairs being stretched out so as to fasten on any animal which comes in their way." "Horses and cattle † suffer greatly from the Ixodes, and even die from exhaustion." I have frequently seen, under the manes of horses who have been out some days at grass, a mass of some dozen or twenty huge ticks, each the size of a broad bean. "The traveller soon wears a belt of bites like the 'shingles' of Lancashire. The tick attacks the most inconvenient places, and the venomous irritating wound will bring on a ricinian fever, like the pulchious fever of Russia. . . . The excitement of day-travelling makes the nuisance comparatively light; but when lying down to sleep, the sufferer is persecuted by the creeping and crawling of the small villain, and the heat of the bed adds much to his tribulation." All this is, alas! too true. "The favourite habitat is the capoeira, or second growth" (after the virgin forest has been cut down), "where the cattle graze. The low shrubs . . . are also good breeding-grounds. Annual prairie fires destroy millions, but the capões, or *bouquets de bois*, act as preserves, and the branches are incrustated with them." I found that they are almost exclusively confined to localities where domestic animals graze. In one pasture there were such countless myriads that my men termed it the Fazenda dos Carrapatos.

One comfort, at least, of the rainy season is that the tropical deluges wash them off the shrubs, so that from October to April

* Vol. i. p. 291.

† "Highlands of Brazil," vol. i. p. 159.

one is free from them. I went out for a few days' work in May, returning each night to town. The wretches were then just hatched, and as small as pins' points. Every night some eighty or a hundred were picked off before they had time to burrow and disappear, for this minute kind ensconces himself entirely beneath the skin. In the dry season I used to sponge myself twice daily with diluted carbolic acid, and cover myself with Keating's powder. It proved rather beneficial, as I found after the day's work that although I was host to hundreds of them, they were generally still roaming, and had not found a place to burrow in, or, at worst, were not firmly fixed. My men advocated various cures—mercurial ointment, cutting them in two with scissors (this is inadvisable, as the head, being left in, festers), inserting a red-hot pin, washing with cachaça and tobacco-water. Captain Burton mentions a Frenchman who was painfully intoxicated after this last process. The ciriema and many other birds are great destroyers of this pest, and are never shot by the natives on that account.

Figgers.—The jiggers are called by the natives "bichos do pé," or foot beasties. The word "bicho" is a very comprehensive term in Brazil. When I showed the natives the portrait of Barnum's white elephant in the *Graphic*, they said, "Oh, que bicho!" ("Oh, what a creature!") Another, speaking of my dog, said, "O cachoro é o bicho mais amaro que ha" ("The dog is the most affectionate animal that exists").

The jigger is the *Pulex irritans*, or *subintrans*, or *minimus*, or *penetrans* (*Aphaniptera*, Kirby), known also as chigre, cheger, chegre, chegve, chigo, chigoe, chigger, jigger, nigua (Span.), chica, chique (Fr.), tungua, tumbura, pique, and chigua. This wretch is too well known to need any description. It is generally only taken from old and dirty houses, and I never came across it until I had my own hired house at Brumado; then I soon made its acquaintance, but found that was due to going about in slippers without socks. I had only five in my feet from January to June. As they are generally supposed to burrow under the toe-nails, I may mention the habitat of my little guests—the first on the right big toe, second and third on right and left heel, and two under the sole of my left foot. I extracted them all myself. I never felt them, but found on examination a hard black speck. I then

carefully cut the cuticle all round with a sharp knife, and dug out the intruder, the wound always bleeding profusely, so that I invariably broke the skin of the sac; I next scraped the circular cavity well inside, to be sure there were no eggs left in the place. I never felt any pain, either at the time or afterwards, and the wound always healed up perfectly, without the application of ammonia or anything but water.

Bernos.—Captain Burton was fortunate enough not to suffer from these insects. They are, indeed, the worst of all torments. He says, "The cattle are painful spectacles, scarred and eaten by the white grub of the local *tzetze*. It is called 'berne.' The word is generally explained as a corruption of *verne* (worm), but I believe it to be of Guarany origin. The worm is mentioned by Azara, who believes that it penetrates the skin. Prince Max. (i. 29) reasonably doubts this. Many tales are told of negroes losing their lives in consequence of the grub being deposited in the nose and other places; if squeezed to death, and not extracted, it may, of course, produce serious results. The usual treatment is by mercurial ointment."* My dog was so bad from their attacks that I feared I should have to kill him; but mercurial ointment proved effectual. He was again attacked, and I had him washed with tobacco-water, the result being that all the *bernos* were killed, and came out gradually, after which he rapidly recovered and put on flesh. In the case of animals, the *bernos* always raise a large hard lump, so with them the worm may possibly not enter beyond the skin; but with those of our staff who suffered, it was different. One of the staff extracted in all about thirty of the maggots, three other men also suffered; while a fifth had one *berno*, which he tried to extract before it was ready, in so doing he killed it, and leaving it in his arm it festered, and finally, owing to ill-treatment by the natives, who put in a seton, he was almost disabled. I also saw a baby of only three months old who had two extracted from it. I suffered from one of these villains under my left knee. At first I thought it was only a specially inflamed carrapate bite, and as I was spotted with them like a plum-pudding I forgot about it. However, it did not heal up, and in about three weeks it became very painful; then a small hole

* "Highlands of Brazil," vol. i. p. 36.

appeared, which was continually discharging, the muscles became hard, swelled, and painful, and I realized at length that it must be a *berno*. I had heard from my friends the cruel practice of the natives in applying a burning stick to the wound to kill the worm, so I determined to keep silent about it; and I did not care to use mercurial ointment or tobacco-water, for fear that the remedy might be worse than the disease. At length the pain became unbearable at certain intervals, when I presume the creature was feeding. Probing the wound with a long darning-needle, it penetrated over an inch before I felt the creature at the end of his burrow. I squeezed the *berno* out alive, and it turned out to be a very large maggot, three-quarters of an inch long and a quarter of an inch in diameter. From the sufferings which that solitary specimen caused me, I can understand how miserable my poor dog must have been, as his back was a mass of sores. It was pitiful to see him. When running about he would turn round every minute with a whine to bite his wounds till they were raw. He also suffered much from *bichos do pé*.

NOTES ON BOTANY.

As is well known, the flora of the high table-lands in Brazil may be separated into two distinct divisions: 1. That of the valleys and watersheds. 2. That of the campos.

Far more marked are these differences than any that exist in our country between the plants of the valleys and mountains or plateaux around. But I must confine myself to a few superficial remarks. I had no opportunity of visiting the country beyond the intricate system of watersheds of the Rios Pará and Paraopéba, except one ride—to within thirty miles of Pitanguy, where the strata change considerably. The various divides of the watershed are all about the same level, three thousand to three thousand two hundred feet, with an isolated mass of considerable extent (the Serra de Cortume). I have given sketches of this mass of hills from two points: from Casa Grande looking eastwards, and from the valley of the Rio Camapuão* looking southwards. This serra may be about five thousand feet high. To the southward, the

* Pronounced Camapuangu.

hills are forest-clad, to the northward are the real watersheds—expanses of rounded downs much broken up by canyons and intersected by deep valleys. The campos are of two kinds: “campos abertos,” or open downs with short grass; and “caatingas,” or grass dotted over with shrubs. In the bottom of all the valleys, near the divides, are “capoeiras,” or “mato” (second growth of trees after the original forest has been burnt), and “mata virgem,” or virgin forest; these sometimes creep up the gorges to the edge of the downs. There are also “carrascos,” which are growths of shrubs and small trees, amid which occasionally rises a monarch of the forest. When the streams, after passing through the forest-clad cloughs, reach the widening valleys, they generally have a belt of trees and shrubs growing along the banks; and as the valleys become broader, there is usually a considerable extent of marsh or “brejo,” which is sometimes grass-land, sometimes thicket. These brejos are always flooded in the rainy season. The clearings are called “roças.” The two sketches may, perhaps, give an idea of the scenery; in each case the background is formed of rounded hills covered with virgin forest. The view from Casa Grande shows various clearings, which were (when the sketch was made in July, 1833) bare, but in the following December were covered with maize ten feet high, castor-oil plants, cotton, sugar-cane, black beans, and gourds. The view from Camapuão Valley shows a wide marsh, with a belt of trees and shrubs about a mile off, through which flows the river; rising behind this is a bare rounded down (campo), in which a barrancado or canyon has been formed. Whatever fault may be found from an artistic point of view, these sketches are at least true to nature; while I am sorry to say that many of the illustrations I have seen in Gardner’s Travels and some other books are very imaginative, and can scarcely be recognized.

With regard to my botanical specimens, I regret that I can only give a very brief account, as the majority of the plants collected were destroyed by the extreme damp of the rainy season. The ceaseless downpours—sometimes for a week together—during the rainy season are sufficiently depressing, but a watertight tent is more or less proof against them. When, however, the sun does appear, and the whole atmosphere is full of a

warm steam, which enters the recesses of every box, and every article in the tent is heavy with condensed vapour, it is exceedingly difficult to protect one's specimens. The rainy season is *the* time for collecting, but the great care and frequent changes of drying-papers necessary require an amount of time which I could not afford; the result was that some one hundred and fifty species alone reached England, many of which could not be identified.

On the dry downs, or "campos abertos," at a level of about three thousand feet, I found Byrsonima, Cambessedesia, and other dwarf Melastomaceæ, gentians, cactuses, Eriocaulon, crotons, Labiatae, Verbenaceæ, Iris, Polygala, Convolvulaceæ, purple, blue, pink, and white, Erythroxylon, Baccharis, Vernonia, and other Compositæ, Myrtaceæ—including the Gabiroba gooseberry (*Psidium cinereum*, Mart.), which is often as plentiful as the bilberry, or whortleberry, in England—Leguminosæ, Solanaceæ, etc. The Solanaceæ include, besides small species and shrubs, the large tree *Solanum lycocarpum*. In some of the smaller species, the leaves and stems are covered with long fine spines or thorns.

In the "caatingas" I gathered Erythroxylon, Styrax, Lythariæ, acacias, Vochysiæ, bignonias, Convolvulaceæ, Malpighiaceæ, Melastomaceæ, etc.; this latter family exists everywhere in Brazil, except on the very dry northern hills. I also found, near Brumado, a new ground-orchid (*Habenaria*), which is described further on; another orchid I gathered is probably new, but is in very bad condition.

In the "capoeiras" I met with bamboos, palms, ferns, tree-ferns; Cassia, Crotalaria, Inga, and other Leguminosæ; passion-flowers, etc. Scarlet-flowered leguminous trees and creepers are very numerous. The Inga, of various species, is very noticeable; it abounds in the belts of forest along the river banks, and forms large bushes, with fine acacia-like leaves, the branches being hidden beneath a dense mass of beautiful crimson or white feathery flowers. There are also many species of lovely passion-flowers, purple and white. The Compositæ are likewise exceedingly plentiful; many of them are shrubs, or small trees ten or fifteen feet high, which are much frequented by butterflies, especially the *Acræa* and *Heliconius*.

The forests defy description, but I may mention the *Cecropia*,

Melastomaceæ, an infinite variety of Palms, Bromeliaceæ, Myrtaceæ; Inga, Acacia, and other Leguminosæ; Euphorbiaceæ, Malpighiaceæ; Smilax, Vanilla, many orchids and other epiphytes; tangled masses of hanging lichens, gigantic lianas; bignonias, and a multitude of ferns—Polypodium, Adiantum, Anemia, etc.—and tree-ferns.

In the marshes I took Begoniæ, Juncaceæ, Cyperaceæ, Compositæ, Zinziberaceæ, Amaryllideæ, etc.

I append a list of the few plants I saved from the damp which ruined my collection; they were named by the kindness of Messrs. J. C. Melvill, M.A., F.L.S., James Britten, F.L.S., H. N. Ridley, M.A., F.L.S., and William Carruthers, F.R.S. The classification is from the "Genera Plantarum," by G. Bentham and Sir J. D. Hooker, London, 1862-1883, and from the "Synopsis Filicum," by Sir W. J. Hooker and J. G. Baker, London, 1874.

All the plants named were collected in the valley of the Rio Camapuão, a small tributary of the Rio Paraopéba, Minas Geraes, or on the table-lands near the valley.

RANUNCULACEÆ.
Anemone decapetala, *L.*

VIOLARIÆ.
Sauvagesia erecta, *H.B.K.*

POLYGALEÆ.
Polygala paniculata, *L.*
several other species.
Monnina sp.

MALVACEÆ.
Pavonia sp.
Hibiscus sp.
Abutilon sp.
Sida sp.

TILIACEÆ.
Corchorus sp.

LINEÆ.
Erythroxylon sp.

MALPIGHIACEÆ.
Byrsonima sp.

LEGUMINOSÆ.
Crotalaria anagyroides, *H.B.K.*
Desmodium, two sp.
Stylosanthes sp.
Zornia diphylla, *Pers.*
Periandra coccinea, *Mart.*
Phaseolus sp.
Collæa speciosa, *D.C.*
Cassia, two sp.
Mimosa dolens, *Vell.*
Calliandra sp.
Inga semialata, *Mart.*
Inga sp.
Æschynomene falcata, *D.C.*
Rhyncosia sp.
Indigofera sp.

ROSACEÆ.
Rubus rosæfolius, *L.*

MYRTACEÆ.
Psidium cinereum, *Mart.*
pyriferum (guava).
sp.
Myrcia, three sp.

MELASTOMACEÆ.

- Cambessedesia ilicifolia, *Tr.*
 Microlicia subsetosa, *D. C.*
 Microlicia sp.
 Acisanthera sp.
 Desmoscelis sp.
 Miconia sp.
 Pleroma gracile, *D. C.*
 Several other obscure species.

LYTHRARIÆ.

- Diplusodon virgatus, *Pohl.*
 Diplusodon sp.

SAMYDACEÆ.

- Casearia sp.

PASSIFLORIÆ.

- Passiflora, several species; native
 name "maracuja," or "herva da
 paixão."

BEGONIACEÆ.

- Begonia sp.; native name "azedinha."

CACTEÆ.

- Echinocactæ, several species.

UMBELLIFERÆ.

- Eryngium sp.

RUBIACEÆ.

- Oldenlandra sp.

COMPOSITÆ.

- Vernonia scorpioides, *Pers.*
 Baccharis sp.

CAMPANULACEÆ.

- Campanula sp.

STYRACEÆ.

- Styrax punctatum, *D. C.*

APOCYNACEÆ.

- Macrosiphonia velame, *Müll. Arg.*

CONVOLVULACEÆ.

- Convolvulus, several species.

SOLANACEÆ.

- Solanum lycocarpum, *St. H.*
 Cestrum sp.

BIGNONIACEÆ.

- Jacaranda tomentosa, *R. Br.*

ACANTHACEÆ.

- Chamæranthemum sp.

VERBENACEÆ.

- Lantana velutina, *L.*
 Stachytarpheta sp.
 Vitex sp.

LABIATÆ.

- Leonurus sibericus, *L.*

NYCTAGINEÆ.

- Mirabilis sp.

EUPHORBIACEÆ.

- Croton sp.
 Manihot, several species.

ORCHIDEÆ.

- Stenorhynchus orchoides, *Rich.*
 Habenaria Melvillii, *Ridley, N.S.*

SCITAMINEÆ.

- Calathea bicolor.
 Canna edulis.

IRIDEÆ.

- Sisyrinchium iridifolium, *H. B. K.*
 Mariana vel Cypella sp.
 sp.

AMARYLLIDEÆ.

- Hypoxis decumbens, *L.*

LILIACEÆ.

- Smilax sp.

COMMELINACEÆ.

- Commelina nudiflora, *L.*
 Dichorisandra aulilittiana, *Michx.*
 Tradescantia elongata, *L.*

PALMÆ.

- Oreodoxa olerosa, *Willd.*

CYPERACEÆ.		Anemia hirta, <i>S.W.</i>
Dichromena nervosa, <i>Michx.</i>		Phyllitidis, <i>S.W.</i>
Fimbristilis communis, <i>Kuntz.</i>		coriacea, <i>Grisb.</i>
		Lygodium venustum, <i>S.W.</i>
FILICES (Ferns).		
Adiantum subcordatum, <i>Sw.</i>		LYCOPODIACEÆ.
trapeziforme, <i>L.</i>		Lycopodium carolinianum, <i>L.</i>
hirtum, <i>Klosch.</i>		
capillus-Veneris, <i>L.</i>		MUSCI (Mosses).
Polypodium Filicula, <i>Klf.</i>		Neckera Lindigii, <i>Hampe.</i>

These plants are now all in the herbarium of Mr. J. C. Melvill.

In the above list it will be observed there is an orchid new to science, which I gathered on the hillside near the town of Brumado, now called Cidade de Entre Rios. Mr. Ridley described it as follows, in the *Journal of Botany* for June, 1885, vol. xxiii. p. 170:—

"*Habenaria Melvillii*, sp. n.—*Tubera lanata clavata*. Folio duo, ovata obtusa patentia petiolata, 7-nervia; lamina majoris 2-uncias longa, $1\frac{1}{2}$ lata, petiolus vix uncialis. Scapus brevissimus $1\frac{1}{2}$ uncia longus. Flores duo magni. Sepala ovata obtusa, lateralia parum obliqua patentia. Petala bifida, lacinia antica erecta, ligulata obtusa falcata, postica longior recta linearis multo angustior, acuminata. Labellum trifidum, lacinia laterales lineares acuminatae, media brevior, obtusa. Calcar longissimum 4-unciale, pendulum rectum, apice paullo dilatato. Columna brevis lata. Anthera haud apiculata, apices longæ curvæ.

"Cidade de Entre Rios, Minas Geraes, Brazil, coll. H. C. Dent.

"The British Museum Herbarium is indebted for this interesting plant to Mr. J. Cosmo Melvill, whose name I have great pleasure in associating with it. It is remarkable for the broadly ovate-petiolate leaves, and the very short flower-stem bearing one (or two) rather large violet and white flowers, and with a spur more than twice the length of the stem. The dorsal sepal is five-eighths of an inch long, the laterals a little longer. The petals are bifid; the upper lobe about the length of the dorsal sepals; the lateral lobe a little over an inch long, much narrower, and tapering away to a fine point. The lip has a short narrow base, ending in three narrow linear lobes; the two outer ones nearly an inch and a quarter long, tapering gradually to a point, the

middle one broader, shorter, and blunt. The long upcurved anther-processes are nearly three-eighths of an inch in length."

Gardner * mentions, passing through Brumado, "a long, straggling village in a state of great decay."

NOTES ON PLANTS, VEGETABLES, AND FRUITS REFERRED TO
ON P. 134.

Tobacco.—"The tobacco of Rio de Pomba, fifteen leagues from Barbacena, and the Rio Novo won the medal at the Industrial Exhibition of Rio de Janeiro; that of Baependy, especially the *fumo crespo*, is a dark, strong leaf, well fitted for making 'cavendish' or 'honey dew.' The soil will be much improved by compost, and the produce by being treated in Virginian style—delicately dried in closed barns with fires" (Captain Burton). After a time I took a great liking to the Pomba tobacco, and brought home a good supply. My friends in general consider it superb.

Bananas.—There are at least six kinds: Banana ôuro, São Tomé, and Prata, which are best eaten raw; B. maçã, da terra, and velhaca, which are generally fried or boiled, not being very sweet or juicy. The banana da terra is commonly known as plantain. This tree often falls to the ground by the weight of its own fruit. The banana tree is always cut down after the fruit is picked, and grows up again the next year. Banana ôuro is the smallest, and velhaca the largest.

Sugar-cane.—Besides the ordinary powdery yellow sugar, there is a product called rapadura, which is abundantly used. It consists of a hard brick-like brown uncrystallized sugar, from which the molasses has not been extracted. Captain Burton says it is only found in South America.

Cachaça, or caxaça, I have frequently referred to, and given the different local names by which it is known. This spirit is distilled from molasses, and is supposed to be pure; but the odour and taste are very disagreeable, though one gets accustomed to it. The price is about 4*l.* a pint. I found it useful and not injurious, when taken in small quantities; while a glass of any of the half-dozen Dutch spirits sold at Brumado invariably disagreed

* "Travels in the Interior of Brazil," p. 385. London, 1849.

with every one of us. I had no leisure to study the comparatively nocuous effects of this or any other spirit on the natives; but the fact that those who are addicted to it soon come to an untimely end may not be owing to any specially injurious properties of cachaça, but simply to the fact that all spirituous liquors are harmful, taken in excess, especially in tropical countries. It is useful for mixing with water for washing purposes, thereby producing a refreshing and stimulating effect, and for anointing insect bites.

Restilo, or *ristiri*, as the name implies, is a redistillation of cachaça, though sometimes applied to the ordinary spirit. It has no smell when in the colourless form, and is much stronger than cachaça, and also dearer, but generally excellent. The good old lady at Camapuão had some tolerable Restilo do Reino, of a fine light-brown colour; and some liquor of the same name, bought at Brumado, was similar to good Jamaica rum. The price was 800 reis (1s. 4d.) per pint bottle.

Chillies, *Pimentas*.—There are many kinds, all excellent. Some are very hot, others mild; some are sweet and lemon-flavoured, others aromatic. The Mineiros are very fond of them; they are a good stomachic.

Quince, *Marmelo*.—These are made into a jam, which is called Marmeláda.

Gooseberry, *Gabiróba*.—This is the *Psidium cinereum* (Mart.), *P. gabiroba*, and others of this extensive genus. In the spring (October), the campos are quite white with the lovely flower of this very abundant bush, which grows to about one or two feet high; and about Christmas, the shrubs are weighed down by the luscious golden fruit, which, in taste, size, and appearance, resemble our gooseberry.

Guava, *Psidium pyrififerum*.—This is an abundant wild fruit. Unpalatable when raw, and with a peculiar pungent, disagreeable smell. It is principally made into *goiabá*, or marmalade, when it is eaten with cheese. This reminded me of the custom that obtains in Lancashire and Yorkshire of eating apple pie or damson tart with the same article.

Potato, *Batata da Índia*.—Yields two crops a year.

Sweet Potato, *Batata doce*, *Ipomœa batatas*, L.—Yields four crops a year.

“Mandioc, *Mandioca*, or *Maniva*, *Jatropha manihot*, L.—Euphorbiaceæ. A plant with wide-spreading branches, originally from Africa, cultivated in India and in America, from the Straits of Magellan to Florida. As food, it is to Brazil what wheat is to Europeans and North Americans. The root is large, tuberous, fleshy, white internally, and full of a white juice very acrid and very poisonous. The leaves are alternate, divided in three, five, or seven lanceolate lobes, deeply cut and pointed, rather sinuous edges, dark green on the upper side and glaucous on the under side. The male flowers are separated from the female, but both exist on the same plant.

“The root of the mandioc is that part of the plant which is most important. Some roots attain a very considerable size, and weigh as much as fifteen kilos (thirty pounds). The root is almost entirely composed of starch, with the addition of a poisonous white juice. This poison, which is very subject to change, appears to be cyanhydric acid, or a substance easily turned into that acid. However, it is found easy to deprive the mandioc root of its acid poisonous quality, either by the action of heat, or by repeated washings. The root then becomes a healthy, as it is also a universal, food. It is used for the preparation of farinha de mandioca (mandioc flour), one of the most valuable articles of diet in use among the Brazilians. The following is the process employed for the production of farinha (pronounced *farinya*):—

“The root is well scraped with a knife, the paste is then reduced by a vertical wheel, and next pressed to deprive it of the poisonous juice. It is then roasted, which extracts the last remains of the poisonous principle, and gives it that look of granulated white flour which is seen at table. It is also called farinha de páo (wood flour, or sawdust).

“The water in which the paste of the mandioc has been washed is left to deposit at the bottom of the vessels a white silt which is very pure starch. This, when dried, is called tapioca, a very delicate and nutritious food.

“The juice of the root is a powerful poison. A small dose is fatal to men and animals after producing vomiting and convulsions. This poisonous principle of the mandioc is very volatile; for if the juice be exposed to the air, it loses its deleterious effects after

thirty-six hours. The same result occurs when the juice is boiled. When distilled, it furnishes a most poisonous liquid; a few drops placed on the tongue of a dog are sufficient to kill him in ten minutes.

"The name manipuêra is given to the liquid resulting from squeezing the scraped root, which latter is placed in the tepiti (a kind of basket or vessel made of taqua russú, or split and plaited taqua.) Notwithstanding its being so poisonous, the juice is employed for preparing tucupi—a sauce much used in Pará, Amazonas, and Maranhão. To prepare it, the liquid is boiled with hot peppers and garlic, or else these ingredients are merely macerated, and then exposed to the air and night dews.

"When the tuber is macerated and placed in water till it begins to ferment, it loses its poisonous properties, and, after being washed in several waters, it is used to make cakes.

"The name mandioca is given to the root, and maniva generally to the plant, of which there are many species." *

Black beans, the feijões (singular *feijão*) to which I refer repeatedly, is *Phaseolus vulgaris*. When stewed in toucinho (lard), they form, with farinha, the staple food of the inhabitants. Another favourite dish is the feijoáda, a stew of meat and black beans, which is also freely covered with farinha and made into a kind of thick mess—most unpleasant to look at, but excellent. A feijoáda is one of the standing dishes at all the meals of his Majesty the Emperor. When at Rio de Janeiro, I was told of a great dinner given at Paris on the occasion of a national fête by the Brazilian Minister to the Brazilian residents in that city. The dinner was to be *au Brésilien*. Dish after dish made its appearance, but no feijoáda. The guests were annoyed, and the host sent for the

* "Diccionario de Botanica Brasileira," de Joaquim de Almeida Pinto.

Mr. H. W. Bates states ("The Naturalist on the Amazons," vol. i. p. 194, note) that "many useful vegetable products have been reclaimed, and it is to the credit of the Indians that they have discovered the use of the mandioc plant, which is highly poisonous in the raw state, and requires a long preparation to fit it for use. It is cultivated throughout the whole of Tropical America . . . but only in the plains, not being seen, according to Humboldt, higher than from six hundred to eight hundred metres, at which elevation it grows on the Mexican Andes. I believe it is not known in what region the plant originated; it is not found wild in the Amazons valley."

cook. He said no power on earth would induce him to send up such a disgusting dish !

There are, of course, hundreds of wild plants which are used as food, for medicine, for dyeing purposes, etc. Press of other work prevented my being able to work out this matter as I should like to have done, but I may mention indigo, *Indigofera tinctoria* ; salsaparilha or sarsaparilla, *Smilax sarsaparilla* ; and ipecacuanha, *Cephalis ipecacuanha*, also called zucaquenha or picahonha. The name *ipecacuanha* is derived from the Indian *ipé-cad-goéne*, "the little plant which causes emeticism" (*goéne*) ; or from *ipé-cad-cintha*, "the little plant of the woman" (*cunha*), being much used in feminine complaints (Captain Burton, vol. i. p. 164, note).

Erythroxylon.—One species of this genus, the celebrated coca, which is now becoming medically famous in England, is extensively "used in Peru for its remarkable power of stimulating the nervous system, in which respect it quite resembles opium. The leaves are used with a small mixture of finely powdered chalk." *

Melastomaceæ are handsome trees, shrubs, or herbaceous plants ; the leaves have five or three ribs ; the flowers are purple or yellow.

There are many plants and shrubs, producing excellent fruit, of which I am unable to give the names. One (found December 10, 1883) grows on a shrub about one foot high ; it is called pitanga, and is a bright crimson fruit, very luscious, tasting like an egg-plum, and has a large bean-shaped kernel. Another good fruit, called cajú, is very curious. It is like a small yellow apple in shape, and, though rather astringent, tastes like an over-ripe American apple ; its large bean-shaped seed grows outside, on the top of the fruit (*Psidium sp.*).

NOTES ON THE GEOLOGY OF THE DISTRICTS VISITED.†

As I had no opportunity of inspecting the limestone districts of the valley of the Rio Paraopéba, wherein occur, in the caves, the remains of men and of animals under similar circumstances to

* "The Vegetable Kingdom," p. 381. John Lindley, 1853.

† M. Liais's "Géologie du Brésil" has been frequently referred to, "Climats, Faune," etc., pp. 1-38.

our own limestone caves, and as I was unable to visit the metalliferous districts of Pitanguy, Ouro Preto, or São João del Rey, though these were all within a ride of a few hours, I shall confine my remarks to the gneissic formations and their decomposition.

Stratified gneiss forms the total mass of the soil in all elevated parts near Rio de Janeiro and over vast areas of the empire of Brazil, the vegetable earth resting immediately on the top of these strata. I observed the same strata at Bahia. Gardner found it in the province of Ceará, five hundred miles to the north of Bahia; and "Humbolt describes the gneiss-granite over an immense area in Venezuela, and even Columbia." * The mineral composition of gneiss—which is made up of quartz, felspar, and mica—is the same as the components of granite, the only difference is in the former's foliated texture, hence gneiss may be described as schistose-granite. The gneiss is always upheaved at a high angle, and though the base is felspathic, the different strata have important structural differences in composition; granite and hornblende are present in different localities, and modify very considerably the composition of the rocks. To enter into the lithological structure of this group of strata is beyond the scope of a brief article; I should have to describe porphyries, granite, syenite, diorite, pegmatite, curite, quartzite, gneiss, mica schists, magnetic ironstone, garnets, murchisonite, kaolin (porcelain clay), and numerous other combinations of quartz, felspar, mica (red, black, or yellow), hornblende, etc., with other metamorphosed sedimentary deposits.

The most salient characteristic of these gneisses is their condition of decomposition, which has been effected on an immense scale. Even the United States do not present such an intensity of remarkable phenomena as do the rocks of Brazil. It is not unusual to find the gneiss completely transformed into clays to a depth of over three hundred yards. The barrancadas or canyons, carved out by the rains, give the plainest evidence of this decomposition. The heavy rains, especially after long continuance of dry seasons, produce the most marvellous effect. As an instance, I may cite (Liais) the storms of March, 1859, when five inches and a half (fourteen centimetres) of rain fell at Rio de

* "Geolog. Observ.," Chas. Darwin, p. 424.

Janeiro in *two hours*, and caused great erosions at the Morro do Castello and on a multitude of argillaceous hills on the Nichteroy side of the bay. One must have seen the torrents in the mountain regions to understand the powerful part which, in the course of centuries, these phenomena can exercise on the configuration of the soil. I have mentioned how the different divides I worked over (four within about twenty miles) are all about the same height (3200 feet), and how these hills abound in canyons, and are separated by steep valleys, hundreds of feet deep, and sometimes a mile or more in breadth. Many of the erosions have the testimony of ocular demonstration. The Visconde de Prados described to M. Liais how one erosion occurred some forty years ago near Barbecena. This crevasse was about seven acres and a half in area, six hundred yards long, fifty-five yards wide, and over thirty feet deep. Therefore, from four hundred thousand to five hundred thousand cubic yards were washed away from this hillside, and the earth excavated entirely disappeared, being carried away by the waters. As these canyons are often from one hundred to three hundred feet deep, they show the power of decomposition by atmospheric agents on the gneiss, and this is in active operation to-day.

These phenomena explain the valleys of denudation; they reveal how watersheds have been changed so that the original tributaries of the Parahyba do Sul or Rio de la Plata may now flow to the Rio São Francisco; and they show how valleys may be formed much more rapidly than might be considered at first sight. It is important to bear in mind the varying resistance to decomposition of different strata. This is the reason of the irregular and picturesque features so abundant in the mountain-ranges, of which the Organs offer a remarkable example. The name "Organ Mountains" has been given from the supposed resemblance of its peaks to the pipes of an organ, especially when seen from Rio. In the account of my journey to Petropolis, I have mentioned the vertical walls of rock surrounding the huge, deep amphitheatre now clothed in virgin forest, which the railway scales triumphantly. The pyramids and masses of rock consist of the harder portions of the original strata, which have been thrust up, like the slates of the Longmynd, in Shropshire, at a

very high angle, the softer strata being gradually washed away. Such remarkable forms as the Sugar-loaf, the Pedra da Gavea, the Corcovado, and others near Rio, with the Pedra da Fortaleza near Parabybúna, are instances of the same phenomena ; the views of sublime beauty which these marvellous peaks present, with the luxuriant vegetation which drapes their less abrupt sides and covers the fertile valleys at their base, at once arrest the attention and charm the eye of even the most *insouciant* of travellers.

My various visits to the railway in course of construction up the Corcovado afforded some insight into the decomposition of the gneiss. I have mentioned that the railway crosses huge gorges, and then plunges into tremendous cuttings. The latter, sometimes nearly a hundred feet deep, were often entirely through decomposed strata, reduced to a clay which could be scraped with the finger, and in which the lines of stratification, contortion of strata, anticlinal and synclinal axes, etc., are very distinctly marked ; the clay being interspersed with veins of hard quartz, and sometimes masses of grey granite which had to be blasted. The photograph of the Principe do Grão Para Railway to Petropolis gives an instance of such masses of rock standing out from the decomposed gneiss. These phenomena occur along the whole course of the Estrada de Ferro Dom Pedro II. to Queluz de Minas, and over our line to Pitanguy, being strongly marked at the divides. To the engineer these features are inconvenient. The masses of hard rock necessitate very sharp curves in following the course of the rivers near the watershed, especially past the frequent cachoeiras (cataracts or waterfalls), when the river may suddenly, after passing along a flat valley half a mile in width, dash through a gorge twenty to fifty feet wide, with vertical sides. Then, again, the argillaceous schists are very treacherous, both in cuttings and banks. In the former, the formation width has to be considerably wider than the line, to allow for the large amount of clay eroded from the sides during the rains, and this is so serious occasionally as to stop the traffic. In forming the embankment, great care has to be exercised in the stuff used, large side-excavations being often imperative, or even recourse to a neighbouring slope to obtain good material ; but after every precaution has been taken, the banks may subside or slide away during the rains.



THE RAILWAY TO PETROPOLIS.

The then newly opened prolongation of the Estrada de Ferro Dom Pedro II. to Queluz de Minas was thus affected in January, 1884, and a long bank had to be remade, causing a stoppage of traffic for some weeks. M. Liais considers the decomposition of the gneiss to be wholly due to atmospheric causes. Mr. Darwin thinks that it took place at a period of subsidence under the sea before the valleys were carved out.* Mr. C. F. Hartt, who accompanied M. Agassiz in his explorations in Rio, Bahia, and the Amazon valley, believes "that it has taken place only in regions anciently or at present covered by forest," and says, "This decomposition results, in my opinion, from the action of the warm rain-water soaking through the rock and carrying with it carbonic acid, derived not only from the air, but from the vegetation decaying upon the soil, together with organic acids, nitrate of ammonia," etc. He states that the same phenomena is observed near New York and in the Neilgherries. M. Agassiz in his "Journal in Brazil," † lays great stress on glacial action. This is a matter which deserves a few remarks, as it is of paramount importance.

I never observed any transported blocks, or striations, or *roches moutonnées*, or anything that could be considered as glacial drift. M. Agassiz is obliged to admit that he never saw any striations which are such a characteristic feature of glacial phenomena, but attributes their disappearance to atmospheric decomposition. Mr. Hartt began his explorations strongly opposed to the glacial theory; but the result of his examinations *and* intercourse with M. Agassiz led him fully to acquiesce in the professor's theory of glaciation. I must be content with summarizing in a few words M. Liais's statement, and confess that I lean strongly to accepting his views. I may also state that Dr. G. S. de Capanema, in his work, "Decomposição dos Penedos do Brazil," ‡ disbelieves in the glacial origin of the surface deposits claimed by Professor Agassiz and Mr. Hartt to be drift, and rather considers them to be the work of decomposition alone. Mr. Hartt lays much stress on the absence of stratification near the surface, attributing this

* "Geological Observations," p. 428.

† "Geological and Physical Geography of Brazil," p. 25.

‡ Published at Rio, 1866.

to the deposit of glacial drift. M. Liais explains that the action of vegetation, animals, insects, dry and wet seasons, wind, etc., are sufficient to destroy the evidence of stratification in these cases. Professor Drummond's article on the "Work of the Termites,"* in which he claims that these insects carry on in the intertropical regions a similar work to that of the earthworms in the temperate zones, at least affords a confirmation of M. Liais's view; and I have alluded to the parti-coloured heaps which they construct, and which forms perhaps the most noticeable feature of the campos. This proves from how many different strata even one nest is made, and the burrowing of these insects, with the cabeçudo ants (*Atta cephalotes*), and the armadillos, must necessarily destroy all traces of stratification to a considerable depth.

"Mr. Belt calculates that the vast amount of water abstracted from the ocean and locked up in mountains of ice around the two poles would lower the general level of the ocean about two thousand feet. This would be equivalent to a general elevation of the land to the same amount, and would thus tend to intensify the cold; and the subsidence of the ocean would produce a tract of lowland of an average width of some hundreds of miles, added to the whole east coast of Central and South America. This tract would no doubt become covered with forests as it was slowly formed, would enjoy a perfectly tropical climate, and would thus afford an ample area for the continued existence and development of the typical South American fauna; even had the glaciers descended in places so low as what is now the level of the sea."†

I would suggest that a difference of two thousand feet in the level of the highlands above the sea would not suffice for the production of the supposed glaciers. This presumption of a glacial period in the tropics presents great difficulties. First, a vast expanse of collecting ground is necessary at a considerable altitude for the *névé* to consolidate into glaciers at a lower level; secondly, it requires for a very prolonged period a very low temperature in the intertropical regions, which would presumably mean such an intense cold in what are now the temperate climes that no life could there exist. I cannot see that either of these

* *Good Words*, May, 1885.

† "Geographical Distribution of Animals," vol. i. p. 151, A. R. Wallace.

premises is proved, especially by osteological relics. M. Liais enters into the glacial theory at great length, but I must refer my readers to his book for a full consideration of the subject. He holds that so far from the equatorial region being less warm at any past epoch, the temperature must have been *higher* to permit the formation of the vast amount of vapour necessary to produce the snows and ice in the temperate zone, which brought about our glacial period. Besides which, no rotation of the earth's axis could make the equatorial region even temporarily polar. M. Liais also cites the existence of remains of animals in the caves covered by the same red clay which M. Agassiz considers to be drift. These animals must have lived prior to the supposed glacial epoch, yet they are identical with existing species now found in the same localities.

M. Liais also shows that the so-called erratic blocks are in close proximity to the virgin rock whence they have been derived. This is also the case with the angulated quartz pebbles described by Mr. Hartt as water-carried stones lying under the drift clay; dykes and veins of the same material are always in close proximity. M. Liais says, "When one is assured that these blocks come really from the region where they are met with; when one sees them sometimes still partially fixed in the decomposed gneiss with its primitive stratification" (as I have described on the Corcovado and Petropolis Railways); "when, finally, one observes the vast scale on which the decomposition of rocks by atmospheric action is carried on in Brazil;—these phenomena have a simple and natural explanation, excluding entirely the idea of transport." The rounded forms which some of these blocks present is also attributable to atmospheric action. M. Agassiz even describes rocks *in situ* with the same peculiarities.

It is very difficult to estimate the thickness of the gneiss formation in Brazil. In the Corcovado range, M. Liais estimates it at a thousand metres. In the Organ Mountains and the Mantiquiera range, in the province of Rio de Janeiro and South Minas Geraes, at six thousand metres.

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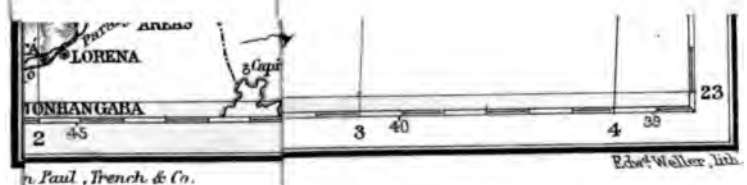
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